Appendix D: Report of Environmental Assessor

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Town and Country Planning Act 1990

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A) Proposed Yorkshire Marina (Bridlington) (Works) Order 2000

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C) Proposed Bridlington Harbour Revision Order 2000

D) The Bridlington Harbour (Constitution) Revision Order 2002

Concurrent public inquiries into the above orders held at Town Hall, Bridlington in October and November 2001 and January, February, March, May, July and October 2002

Report to Mr M Ellison MA Oxon, Solicitor, the Inspector appointed to hear objections and representations in relation to the orders and associated matters listed above by Professor T O Pritchard PhD BSc FRSA, the Assessor with respect to environmental matters

Part 1

Chapter 1: preamble

Terms of reference of my appointment and the task

1.1 In pursuance of Section 11 of the Transport and Works Act 1992 and Paragraph 4 (3) of Schedule 3 of the Harbours Act 1964 as amended by the Transport Act 1981, I have been appointed as Assessor in respect of environmental matters to advise Mr M Ellison, Solicitor and Inspector who is appointed to hear objections and representations in relation to the orders and associated matters listed on the front cover of this report. I am a professional environmental scientist and a member of the Lord Chancellor's Panel of Inspectors in the Planning Inspectorate.

1.2 I am required to assess what environmental changes would occur if the Proposed Yorkshire Marina (Bridlington) (Works) Order 2000 ("the Works Order") and the associated orders indicated above are confirmed and the proposed Yorkshire Marina scheme at Bridlington ("the proposed marina scheme" or "proposed scheme") is developed. In carrying out the task I have considered all the evidence submitted in writing and orally at the concurrent public inquiries relevant to the consideration of environmental matters.

1.3 The Secretary of State for Transport, Local Government and the Regions issued a statement setting out the matters about which he and the Secretary of State for Environment, Food and Rural Affairs wish to be informed for the purposes of their consideration of the applications for the orders. That statement was served under Rule 7(8) of the Transport and Works Order (Inquiries Procedure) Rules 1992. A part of his statement relates to the effects of the construction and operation of the proposed marina on the environment in the Bridlington area, including:

- any impacts on nature conservation, including impacts on the protected sites at Flamborough Head;
- any impacts on the marine environment, including effects of the proposed works, dredging and spoil deposition on sedimentation in Bridlington Bay;
- the visual effects of the proposed works; and
- traffic generation.

1.4 The statement also indicates that the Secretaries of State would wish to be informed on the Council's proposals for mitigating any adverse environmental impacts, including:

- any measures to avoid, reduce or remedy any major adverse environmental impacts of the proposed works;
- any measures to avoid, reduce or remedy any other adverse environmental impacts likely to arise from the works; and
- whether, and if so to what extent, any adverse environmental impacts would still remain after the proposed mitigation measures had been put into place.

Attendance at the public inquiries and site visits

1.5 I attended all meetings of the inquiries except those devoted exclusively to consideration of listed building matters being assessed by my colleague, Dr Lynn Moseley. I also attended site meetings before, during and after the inquiries, and two of those involved the use of boats to view the coastline and the marine environment generally between Flamborough Head and Bridlington.

The environmental statement submitted by the applicants for the Transport and Works Order, namely East Riding of Yorkshire Council

1.6 In November 1999, Posford Duvivier Environment ("Posford Duvivier"), now part of Posford Haskoning Ltd, were commissioned as consultants by East Riding of Yorkshire Council ("the Council") to carry out an environmental impact assessment ("EIA") of their proposal to develop a marina scheme at Bridlington. As the works involved in the scheme would interfere with rights of navigation they must be authorised by an order made by the Secretary of State under the Transport and Works Act 1972 before construction can commence.

1.7 The application for a Transport and Works Act order requires applicants to provide an environmental statement ("ES") following the carrying out of an EIA, in accordance with the Transport and Works (Applications and Objections Procedure) Rules 1992. Policy guidance on implementation of the EIA regulations is found in Circular 2/99 issued in 1999 by the Department of Environment, Transport and the Regions. The ES for the Works Order, prepared by Posford Duvivier, is entitled *The Yorkshire Marina, Bridlington: Environmental Statement*, dated October 2000 and submitted to the inquiries as Document ERYC 2. It is a report of an EIA carried out in 1999 and 2000, a process that was established upon the findings of a scoping study involving various organisations with an interest in the scheme. The ES deals with those significant impacts on the environment associated with the proposals in the scheme. It contains five sections: introduction, description of the proposed development, the existing environment, assessment of effects of the scheme on the environment, and findings and conclusions. It also contains a non-technical summary, glossary of terms, and appendices, the whole document covering almost 400 pages.

1.8 As the proposed scheme could have an impact on a nature conservation site, situated near Flamborough Head some 700 metres ("m") to the east of Bridlington, which is a candidate for designation under the requirements of the EU Habitats Directive and its implementation in the UK through the Conservation (Natural Habitats, etc) (Amendments) (England) 2000 Regulations 1994, there is a need for what is known as "an appropriate assessment" (Documents ERYC 58, ERYC 59 and ERYC 60). An appropriate assessment is required for any plan or project likely to have a significant effect on a European designated site. A European site is defined as either a Special Protection Area ("SPA") or a Special Area of Conservation ("SAC") where it has been agreed that the site is of European Community Importance ("SCI") under the provisions of a programme known as Natura 2000.

1.9 In the case of the Works Order scheme appropriate assessment is required because of the potential of the scheme to have an impact on the Flamborough Head nature conservation area, which is a candidate for designation as an SAC ("cSAC"). Responsibility for carrying out an appropriate assessment to determine if the scheme would adversely affect the integrity of such a site falls to the relevant competent authorities. The Council recognise the Secretary of State as the lead competent authority in that respect but as such an authority in their own right, they have prepared an appropriate assessment with respect to the potential effect of proposals in the Order on the Flamborough Head cSAC, drawing on the technical information provided in the ES.

1.10 The conservation status of the cSAC and other features of the natural environment in the Flamborough Head area are described later in Chapter 2 of this report, Paragraphs 2.9 to 2.13. Essentially, the cSAC designation concerns the protection of communities of animals and plants in distinctive habitats comprising rocky shores, kelp seaweed forests and sub-tidal turf, as well as populations of organisms that inhabit submerged or partially submerged sea caves.

1.11 Document ERYC 2 is the principal inquiry document covering the effects of the proposed scheme on the natural and human environment. It serves as a guideline for the parties in considering the issues involved. However, such issues feature in other statements submitted to the inquiries. Environment is primary in the evidence of certain witnesses appearing on behalf of the Council, and in the statements of case of objectors and submissions of interested parties. To assess such a voluminous, wide-ranging and pervasive contribution to the proceedings I have decided to deal with the evidence on a topic related basis.

1.12 The layout of the five principal sections of the ES, referred to in Paragraph 1.7 above, provides a useful framework for that purpose, as the subject matter has been assembled sequentially in accordance with the officially recognised procedures customarily followed in the preparation of such statements. I have adopted that framework as a template, modified to ensure that appropriate emphasis is placed on environmental subject matter considered at the inquiries that may not be covered in the ES, such as aspects of the evidence of some of the objectors.

1.13 This report of my assessments, findings and conclusions, and recommendations addressed to the Inspector, falls into five parts and 10 chapters, as indicated below and on the contents page.

- Part 1 is a preamble, covered in Chapter 1, which indicates, the terms of reference of my appointment, my approach to the task and various statutory matters.
- Part 2 is a description and assessment of the existing environment that would actually or potentially be affected by the proposed scheme, dealing with the areas and features involved and the issues arising. The topics are covered in Chapter 2.
- Part 3 deals with the adequacy and accuracy of the EIA and ES, reported in Chapter 3.
- Part 4, the bulk of the report, deals with the effects of the proposed scheme on the environment, reported in Chapter 4 to Chapter 9.
- Part 5 contains, in Chapter 10, the report of my conclusions, and recommendation to the Inspector.

1.14 In this report I refer to numbered documents issued at the inquiries that are directly relevant to my assessments of environmental matters. I have also taken into account other inquiry documents, but they are not indicated in the text because they are less directly relevant to environmental matters. A full list of the titles of the numbered documents is attached to the Inspector's report.

Part 2

Chapter 2: description and assessment of the existing environment that would actually or potentially be affected by the proposed marina scheme

Location of the proposed scheme and the study area in the EIA and ES

2.1 The scheme would be located in the town of Bridlington on the stretch of coast in eastern England known as the Bridlington Bay and Holderness area. There has been much erosion in this area since the retreat of the last Ice Age some 12,000 years ago, which left behind boulder clay deposits covering an area of some 400 square kilometres ("km²") that we now know as the Holderness coastline. It stretches over a distance of 67 kilometres ("km") from Flamborough Head southward to Spurn Point at the mouth of the Humber Estuary. It is the youngest section, geologically speaking, of the coastline of the United Kingdom and is among those exhibiting very fast erosion.

2.2 The other features of primary interest in the area are the chalk cliffs at Flamborough Head and the large sand banks known as Smithic Sands or Smithic Bank. The existence of these physiographic features is an important aspect of the proposal to develop a marina scheme at Bridlington and it is a conspicuous aspect of the studies carried out that are relevant to the scheme.

2.3 The study area adopted for the EIA, shown in the plan in Figure 1.2 of Document ERYC 2, is bounded to the north by Flamborough Head and to the south by a line running seaward from the village of Barmston situated approximately 8.0 km to the south of Bridlington. Landward it includes Bridlington and its mainly agricultural hinterland, and Carnaby Industrial Estate situated 3.5 km to the south west of the town. Seaward it extends to a line drawn off Flamborough Head in a north - south direction. This includes Smithic Bank, a submerged physical feature that is broadly parallel to the shoreline at a distance of approximately 4.0 km to 4. 5 km off-shore from the entrance of Bridlington Harbour.

2.4 I estimate that the study area altogether embraces approximately 56 km² of the sea in Bridlington Bay and 34 km² of the hinterland, a total of approximately 90 km². In this report, Bridlington Bay is defined environmentally as the area of sea that lies between Flamborough Head to the north and the Auburn Drain, situated approximately 4.0 km to the south of Bridlington, as well as the beaches, cliffs and other contiguous coastline. Its eastern boundary is normally regarded to be the seaward side of the Smithic Bank.

Overall evaluation of the existing coastline and marine environment

2.5 The EIA relies heavily on the data and appraisals contained in Appendix 5 of Document ERYC 2 entitled *Review of Coastal and Sediment Transport Processes* prepared mainly by Posford Duvivier and associated consultants to expand upon historical information available for the study area. While there are gaps in knowledge and uncertainties remain regarding the results obtained from some of the studies it is possible to make reasonable assessments of the physical characteristics of the study area. They embrace geology and geomorphology, ecology and nature conservation, coastal processes including wave climate and wave behaviour, tides and currents, and sedimentation processes and associated hydrodynamics.

2.6 The coastal regime of Bridlington Bay is strongly influenced by two basic environmental factors - the wave climate and the tidal currents. Flamborough Head has a key influence on the site of the proposed marina scheme through its effect on these two environmental factors. The presence of this headland results in the bay having an oblique but sheltered wave climate from the North Sea. It also influences circulation of currents in the bay resulting in complicated and sluggish patterns in the vicinity of Bridlington. The interaction of these two basic environmental factors defines the sediment transport patterns, which extend to a distance of several hundred metres off-shore, and the Smithic Bank acts as both a source and a sink for the sediment along the coastline. The significance of these

factors is a crucial issue in determining the impact of the proposed scheme on the marine environment, a matter exhaustively considered at the inquiries.

The coastal regime

2.7 Reports of scientific studies, particularly those carried out since 1983, provide the following information about the coastal regime in the Bridlington Bay area.

Geology and geomorphology

2.8 The coastline of the bay is characterised by the presence of three distinct formations, namely chalk, boulder clay and sand. They are the chalk cliffs of Flamborough Head, some 30 m in height; boulder clay cliffs between Flamborough and Sewerby, a village situated 2.0 km to the north of Bridlington, and similar cliffs immediately to the south of the Beaconsfield Promenade on Bridlington North Beach; and sand dunes to the south of the town as far as the village of Fraisthorpe situated some 4.0 km along the coast. The cliffs are susceptible to erosion caused by rainfall and surface run-off, but their orientation is such as to give them protection from dominant wave action. Around Flamborough Head there are caves, arches and stacks created by the weathering of the chalk, as well as blow holes and wave cut platforms created by marine erosion. The boulder clay areas are similar to other extensive sections of the coast of eastern England, the youngest coastline in the United Kingdom and among the fastest to erode. There is active erosion of the boulder clay in the Bridlington area.

Ecology, nature conservation and landscape protection associated with the Flamborough Head area

2.9 The headland of Flamborough Head and surroundings are scheduled as a Site of Special Scientific Interest ("SSSI") under the provisions of Section 28 of the Wildlife and Countryside Act 1981, as the area has features that make it important for studies in coastal geomorphology. The geological and geomorphological interest is contained in the coastal chalk cliffs between Reighton and Sewerby where the chalk has been eroded to form impressive stacks and caves. These exposures are also of biological interest as they support important breeding bird colonies as well as distinctive plant communities. The international importance of the area, which is designated as a cSAC under the provisions of the European Union ("EU") Directive on the Conservation of Natural Habitats and Wild Fauna and Flora of 1992 (92/43/EEC), stems from the existence of a rock sequence of the Upper Jurassic period, and sequences of Kimmeridge Clay, features that are not visible anywhere else in Yorkshire.

2.10 The area covered by the cSAC is shown in the plan in Appendix 2 of Document ERYC 2 and in Documents REP 2 and REP 3 submitted by English Nature. It is designated because it contains habitat types such as vegetated sea cliffs, reefs and sea caves, submerged and partly submerged, which are rare or threatened as natural features of scientific importance in a European context.

2.11 Flamborough Head and Bempton Cliffs have also been designated as a Special Protection Area ("SPA") under the provisions of the EU Directive on the Conservation of Wild Birds of 1979 (79/409/EEC). This area qualifies for designation under Article 4.2 of that directive because it regularly supports an internationally important breeding population of kittiwakes. It also contains nationally important populations of migratory sea birds such as guillemots, razorbills and puffins. The Royal Society for the Protection of Birds ("RSPB") manages a non-statutory nature reserve at Bempton Cliffs, which also supports an important gannetry.

2.12 English Nature identify Flamborough Head as a Sensitive Marine Area ("SMA"), a non-statutory designation that ensures recognition of its importance in estuarine and coastal management frameworks that support nature conservation. The headland also forms part of a length of Heritage Coast, a local authority designation that recognises the exceptionally fine scenic beauty of the landscape.

2.13 These designations focus attention on the need to conserve features of special interest in the Flamborough Head area that are important in a national or wider European context. The statutory measures, regulations and policies adopted by the EU and the Government are aimed in this case at ensuring these areas are not subjected to damage either in the short-term or in the longer-term by any development. However, they should not be considered in isolation from the high quality of the ecological systems in the surrounding marine environment, as Bridlington Bay is generally free of pollution and not subjected to other adverse impacts. The conservation of this wider marine environment is considered to be important to protect the native fauna and flora and to ensure that there is an undisturbed buffer zone between the proposed scheme at Bridlington and the cSAC, SPA, SSSI and other notable features in the Flamborough Head area.

Sedimentology of the sea bed

2.14 The other geological features of significance in Bridlington Bay are the wide areas of sandy beaches in front of the sea walls of the town, and the off-shore sand bank of Smithic Bank. The sandy beaches are encouraged by the presence of a groyne field, which serves to trap sediment in the near-shore zone within 200 m of the town's sea walls. Some sedimentologists view the beaches as a shoreward extension of the sandy deposits of the Smithic Bank. This sand bank is the subject of many debates about its effect on the existing beaches as well as regarding the potential impact of the proposed scheme on its behaviour in the future. Smithic Bank is shown in plan in Ordnance Survey maps and Admiralty charts, for example in Documents BPHC 23 and BPHC 24. Its southernmost point lies approximately 4.0 km to 4.5 km off-shore of the entrance to Bridlington Harbour, and it is described in more detail in Appendix 5 of Document ERYC 2. There are also several scientific papers among the inquiry documents on sea bed characteristics, sand banks and ridges and associated aspect of the Bridlington Bay and Holderness Coast (Documents ERYC 90 to ERYC 105).

2.15 Hydrographic surveys indicate that the sea bed near Bridlington Harbour is made up of three distinct zones, which are classified as fine sand, medium to coarse sands, and coarse gravel possibly with rocky outcrops. There is also a physiographic feature, known as "the Canch", approximately 50 m long, made up of medium to coarse sand, running due south from the point where the tip of the northern breakwater to be built as part of the proposed scheme would be positioned. It is shown in the plan in Document ERYC 56 and in photographs in Documents OBJ/125 and OBJ/148. There is much discussion about the effect of the proposed breakwater on the sedimentary processes that create and sustain this feature.

Coastal processes

Wave climate

2.16 Wave activity for a set wave point located due east of Bridlington appears, diagrammatically, in the form of a wave rose in Document ERYC 2, in Figure 3.2 and 3.3, and in Figure 2 of Appendix A to Appendix 5 of that document. The wave rose demonstrates that the majority of waves affecting the site of the proposed scheme are arriving from the north east quadrant. Assessments of wave transformations, from off-shore to in-shore, have been undertaken using a numerical model to derive wave heights at the 5.0 m Chart Datum ("CD") depth contour for use in the preliminary design studies of the breakwater structures of the scheme. These data have also been used as an input into the harbour disturbance model devised by the consultants. Results of these studies are provided in the ES and they contribute to interpretation of the coastal processes involved and the potential impact of the scheme on the ambient coastal regime.

2.17 Flamborough Head shelters the frontage of the town of Bridlington from waves approaching between 0 degrees and 60 degrees, as shown in vector plots in Figure 3.4 and Figure 3.5 in Document ERYC 2. Moreover, several processes, such as refraction, shoaling, wave breaking, bottom friction and diffraction result in wave height decreasing as the waves approach the shore. Waves that reach the shore are significantly different in terms of height and direction from those generated off-shore. Smithic Bank is considered to be important as a factor in wave behaviour by acting as an off-shore

breakwater upon which the largest north easterly waves break before they reach the shore. The sand deposits of the beaches in Bridlington are also an integral part of the Smithic Bank system.

Tidal currents

2.18 The numerical hydrodynamic model operated by Yorkshire Water, dated 1999 and referred to in Documents APP/P17 and APP/AP19, is the most detailed source of information about movement of currents in the Bridlington Bay area. It is used by Posford Duvivier to assess the impact of the proposed works on the tidal currents; and it has been passed by the Environment Agency as fit for the purpose. The model covers Flamborough Head and the coastline south of Bridlington as far as Atwick, and provides a substantial contribution to our understanding of the behaviour of currents in this area.

2.19 Hydrodynamic vector plots containing tidal current data are included in Appendix B to Appendix 5 of Document ERYC 2. The model shows the following characteristics of the area.

- At high tide flood a clockwise circulation on the spring tide is demonstrated; velocity vectors along the shore are very weak.
- At high tide mid-flood the clockwise circulation observed at high tide flood has broken down and all flow is moving south.
- At low tide ebb the pattern of flow reflects the position shown for the high tide, with weak flows close in-shore along the Bridlington frontage; and there is a small anticlockwise circulation immediately to the north of Flamborough Head.
- At low tide mid-ebb the currents on the spring ebb tide are stronger and more definitive than those described above for the ebb tide.

Sediment transport

Mechanisms

2.20 Sediment transport along the coastline comprises bed load, which is material carried along the sea bed under the action of waves and currents; and suspended load, which is material taken up in the water column as a result of waves breaking and strong bed currents, and is then transported within the water column. Sediment material moves either as long-shore transport or cross-shore transport. The former is movement of sediment along the shore and is a primary mechanism for changes in beach plan shape. Cross-shore transport, on the other hand, is a process whereby material is taken from the beaches and transported off-shore; or material taken from the sea bed and moved on-shore as a result of waves arriving perpendicular to the shoreline. The response of the beaches under cross-shore transport ranges from immediate change, that is, within one tidal cycle, to longer-term seasonal change, which may take place over a period of several months.

2.21 These two transport mechanisms collectively account for the development of beach plan shapes and profiles under the action of waves and currents. The interaction between the mechanisms is complex since beach profiles and sections change almost daily. The mechanisms are of considerable relevance to the Bridlington Bay area and its extensive sandy beaches.

Sediment budget

2.22 A sediment budget identifies sources from where material is derived to supply the sediment system and the places where it is lost from the system. It involves identifying the area under consideration, and sediment sources, sediment sinks and sediment storage. These parameters are described briefly below with respect to the study area.

Area under consideration

2.23 The whole of the Holderness coastline should be the area considered with respect to any potential impact of the proposed scheme on sediment budget.

Sediment sources

2.24 The sources of sediments are cliffs eroding between Flamborough Head and Sewerby, and to the south of Bridlington. Severe storms also bring material from Filey Bay around Flamborough Head to Bridlington Bay, and Smithic Bank contributes to the beaches on either side of the town. Estimates of the quantities involved are available, but the figures obtained are very approximate and display a wide range of variation.

Sediment sinks

2.25 A large proportion of the sediment yielded from cliff erosion is lost off-shore through suspension in the water column and subsequent dispersion by currents and wave action.

Sediment storage

2.26 The long-shore transport regime is of particular relevance with respect to the proposed scheme. This regime acts on the sediments stored on the beaches and near-shore areas. It determines the transport pathways that may or may not be affected by the scheme. Several studies carried out between 1983 and 2000 in the Holderness area, including Bridlington Bay, have yielded sediment deposition data that differ widely, ranging for example between 80,000 cubic metres ("m³") annually, in one case, and 250,000 m³ annually, in another.

Sediment transport characteristics of the beaches and near-shore areas at Bridlington

2.27 Sediment transport characteristics in the area close to the site of the proposed works are described in the ES in some detail. The beaches, to the north and to the south of Bridlington, are partly fed by the ebb tide, which moves material contained in the water column northwards. The clockwise circulation of water on the flood tides augments this ebb tide movement. The material is likely to be fine sand and silt, since the currents close in-shore are generally weak. Under such a regime it is also likely that a portion of this fine material contributes to the accumulation of silt in the harbour.

2.28 Waves also affect the sediment regime. The predominance of waves from the north and north east sectors plays a significant role in the southerly movement of sediment. UNIBEST-LT beach profiles derived from coastal defence studies shown in Figure 3.6 and Figure 3.7 of Document ERYC 2 indicate the potential drift rates. These data relate solely to wave driven sediment transport, but the effects of tidal currents and drift potential are also considered. Under the action of current alone there is a total current driven drift northwards of the order of 50,000 m³ per annum. This would act against the wave driven component and hence reduce the overall net sediment transport southwards.

Coastal and off-shore habitats of fauna and flora

2.29 Native fauna and flora exist in natural and semi-natural habitats on the beach and in the sea areas that would be buried under the footprint of the proposed works. They also occur in parts of the coastal zone in the study area that may be affected by the scheme, referred to in the ES as the surrounding area. The ES contains historical information as well as the results of surveys carried out to obtain additional data about species and their habitats. Information on the natural features of the environment and the ecological aspects is summarised below.

The area surrounding the site of the proposed works

2.30 The wave cut chalk platform located off-shore in Bridlington Bay and at Flamborough Head is an important marine habitat for fauna and flora and is occupied by a diverse community of organisms including several species of fish that use Smithic Bank in particular. The composition of the littoral faunal communities, exposed at low tides, varies according to the characteristics of the

substrata. For example, at Flamborough Head exposed bedrock and boulders favour barnacles, lichens and snails, while the sandy substrates at Bridlington favour bivalves and lugworms.

2.31 In the sub-littoral zone, where organisms are always submerged, diversity and type of animal communities are also determined by the nature of the local substrata. Sponges, anemones and cup corals are found on chalk off Flamborough Head, while the sandy areas near Bridlington have few species, and the composition of the fauna at those locations is dominated by the crustaceans and polychaetes, including hermit crabs, sandmason worms, cutworms and amphipods. The composition of the sub-littoral flora is similarly determined by substrate type, and it is forests of kelp and the seaweed species belonging to the genus *Fucus* that are found to occur off the Flamborough Head coastline.

2.32 The geological and ecological significance of Flamborough Head and adjacent areas is described in Paragraphs 2.8 to 2.13, above. The nature conservation designations represent the geomorphological and geological features of that part of Bridlington Bay and its coastline as well as its ecological significance. Distinctive communities of native plants and animals, including substantial populations of birds, are to be found in the area occupying a variety of coastal zone habitats. The area is unspoilt in any way and is given high priority for nature conservation and landscape protection. English Nature's evidence explains the significance of this area and other natural environmental features in Bridlington Bay (Documents REP/2 to REP/6).

The development area directly involved in the construction and maintenance of the proposed works and associated structures

2.33 Marine biological surveys of the littoral and sub-littoral communities extending over an area directly involved in the construction of the scheme and its subsequent operation and maintenance are indicated on plans in Figure 3.8, Figure 3.9 and Figure 3.10 in Document ERYC 2. The findings are summarised below.

Littoral surveys

2.34 The littoral foreshore, situated to the north and to the south of Bridlington Harbour, was surveyed in August 2000 using the Marine Nature Conservation Review ("MNCR") Phase 1 techniques and standards. This method, used widely by ecologists and nature conservationists, notes the habitats and species present in the area under investigation and then assigns them to definable biotopes, that is, habitat systems.

2.35 A biotope is defined as a habitat, that is, the environment's physical and chemical characteristics, together with its recurring associated community of species, operating together at a particular scale. It is a term that refers to the combination of physical environment and its distinctive assemblage of conspicuous species. The survey was carried out on a site covering an area extending from mean high water mark ("MHWM") to the lowest level of the tide at the time, which was 0.3 m. The data obtained indicate the presence of 25 biotopes and sub-biotopes, each of which is given an identification code. The site is described as comprising the major habitat of littoral sediments, coded "LS", and a habitat complex of littoral gravels and sands, coded "LGS", while sandy shore habitats, coded "LGS.S", dominate both to the north and to the south of Bridlington Harbour.

2.36 The results demonstrate that the littoral zone can be described as predominantly composed of biologically barren sand, or species poor sand with the rocky shore biotopes identified being confined to the main man-made structures such as the harbour walls. These walls, and other man-made structures, add diversity to what is otherwise described as a biologically poor area by allowing the attachment and survival of a more diverse range of animal and plant species.

Sub-littoral surveys

2.37 Sub-littoral surveys of the near-shore areas off Bridlington Harbour were carried out in September 2000, using a grab, at 20 predetermined sites located at points shown on the plan in Figure 3.10 of Document ERYC 2. The data obtained indicate that sub-littoral habitats are again heavily

sand-influenced and consequently dominated by a fauna comprising mainly of polychaetes and substrate burrowing crustaceans. However, some areas resisted penetration by the grab and the characteristics of the sea bed in those places remains unexplained. The ES considers that they could possibly be isolated patches of exposed bedrock and unlikely to be important habitats for marine nature conservation given the reduced fauna of the surrounding sites.

2.38 The organisms and habitats identified in the survey area are not uncommon in this stretch of coastline. They are not similar in terms of biological diversity and national nature conservation significance to the features present in the cSAC at Flamborough Head.

Bird populations and their habitats

2.39 Bridlington Bay is noteworthy as a site for wintering purple sandpipers. Some of the birds use habitats near the harbour, mainly for feeding in the seaweed-covered boulders near the South Pier, an area that extends for about 40 m alongside the harbour wall. This part of the beach is also used by between 15 and 20 turnstone individuals for feeding at certain times of the year. Both species are typical of rocky shores and seaweed-covered boulders. Sanderling occurs along the strandline and the population may occasionally reach 750 individuals.

2.40 The designation of Flamborough Head, including Bempton Cliffs situated to the north of the headland, on ornithological grounds as an SPA under the Directive 79/409/EEC is reported in Paragraph 2.11, above.

Fish and shellfish

2.41 The North Sea off the east coast of England supports valuable spawning and nursery habitats for fish and shellfish. About 20 species of finfish are caught for commercial gain.

2.42 The main whitefish caught commercially are cod, haddock and whiting; and flatfish include plaice, dab, lemon sole, Dover sole, turbot and brill. The migratory species are salmon and sea trout. Compared to other regional and national ports Bridlington is not commercially important for finfish although there are good spawning and nursery grounds in the area. Cod and plaice spawn further off-shore, and to the south there is a large turbot and sole spawning ground.

2.43 The main species of shellfish caught commercially are lobster, velvet swimming crab, whelk and edible crab. They exist at good densities in and around the study area, which is reflected in the high catches of these species landed at Bridlington. There are razor shell species present that have potential for exploitation.

2.44 The shellfish resource of the sea around Bridlington is of national importance although the majority of the key habitats are not located in the vicinity of the site of the proposed marina scheme. For landing finfish, Bridlington Harbour is not so important although it is among the group of top five ports on the east coast of England in terms of catches.

Water quality

2.45 The site of the proposed works is close to three areas of controlled water, as designated under Section 104 of the Water Resources Act 1991, namely the bathing waters of Bridlington North Beach and Bridlington South Beach, and the Gypsey Race stream that drains into the North Sea within Bridlington Harbour. The two beaches are classified as "Bathing Beaches" under the provisions of the EC Bathing Water Directive of 1976 (76/160/EC), and the Council and the Environment Agency continuously monitor their water quality during the summer months in accordance with the requirements of the directive. Standards for monitoring bathing water quality are laid down in the Bathing Water Regulations 1991 (SI 1991/1597). Continued adherence to bathing water standards is essential to maintain the attraction of the beaches to the public.

2.46 Water quality data obtained since 1995 are variable, especially in the case of South Beach. However, North Beach achieved water quality standard rated as "good" in the period 1996 to 1999,

and "excellent" in 1995. South Beach was also rated "excellent" in 1995, but "poor" in 1997 and "good" in 1998 and 1999. No water quality standard data for subsequent years are provided.

Sediment quality of the existing Bridlington Harbour and the site of the proposed scheme

2.47 Varying amounts of annual maintenance dredging is required to allow for the safe navigation of vessels within the harbour and at its entrance. Currently a licence exists, issued to the Bridlington Piers and Harbour Commissioners ("the Commissioners") under the provisions of the Food and Environmental Protection Act 1985 ("FEPA 1985"), for the annual disposal at sea of up to 20,000 wet tonnes of dredged bed sediment. The sediment is dumped at a location situated to the south of Flamborough Head, known as the FEPA 1985 HU015 licensed disposal site. The site has been in use since the inception of the FEPA 1985 Act solely for the disposal of maintenance dredging material from the port of Bridlington. The HU015 disposal site is located to the north west of the South Smithic Bank sand bank at a chart depth of approximately 7.0 m. The amount of material removed by dredging for disposal did vary annually up to the limit of 32,000 wet tonnes allowed in a previous licence. Details of the actual quantities dumped in the period 1980 to 2001 are given in a table in Document OBJ/131, the figures having been derived partly from the Ministry of Agriculture, Fisheries and Food ("MAFF") Disposal at Sea Database for 1999. Data also appear in Document APP/RP52, which are derived from the MAFF database record for the period 1989 to 2000.

2.48 Sediment quality data, obtained from the MAFF before their duties were taken over by the Department of Environment, Food and Rural Affairs ("DEFRA"), do not indicate significant levels of contaminants. However, certain parts of the harbour, notably the area around the wooden pier known as The Chicken Run Jetty and shown on the plan in Document ERYC 3, contain high levels of tributyl tin ("TBT"), an organo-tin compound with biocidal properties that was used since the 1950s as an antifoulant for boats until it was banned by UK legislation in 1987. The Chicken Run Jetty area is excluded from dredging operations because disposal of TBT contaminated material at sea is not allowed.

2.49 No data have been made available covering the quality of the virgin bed sediments situated in an area immediately to the south of the harbour. The virgin beds are, however, expected to be of good quality because the area concerned has not been dredged in the past and it is not situated close to significant sources of pollution.

Air and climate

2.50 Principal air pollutants of concern are nitrogen dioxide ("NO_2") and nitric oxide ("NO"), collectively referred to as "NOx", and particulate matter. The NOx compounds usually arise from vehicle exhaust and fossil fuel emissions, notably those of coal-fired power stations. Particulates are a mixture of finely divided organic and inorganic substances, which may be dispersed into the atmosphere from sources such as diesel smoke, fine ash and land dust.

2.51 The Council have carried out a first stage air quality review in accordance with the requirements in Part IV of the Environment Act 1995 and the National Air Quality Strategy ("NAQS"). The review identified existing and proposed processes that have a potential to emit significant quantities of NOx. There have also been limited studies with respect to the PM10 quality standard for particulates.

2.52 It is evident on the basis of the information available that Bridlington generally enjoys good air quality. Wind conditions together with the absence of major conurbations and large industrial sources of atmospheric emissions ensure that levels of air pollution are low. The Council conclude that, in general, the air quality standard target for 2005 will be met. Any new sources of pollution, for example emissions from additional industrial development, would contribute to background levels and perhaps compromise the existing air quality.

Noise and vibration

2.53 Background noise levels in the vicinity of Bridlington Harbour are characterised by contributions from road traffic, activities on piers, quays and walkways, pedestrian and tourist activities and miscellaneous sources, including the sounds of seagulls, banging of halyards on the masts of yachts and dinghies and associated wind noise. There are also occasional noisy activities associated with repair and maintenance work, noise caused by wind from distant sources, and noise propagated by the particular topography of the harbour. The nearest sensitive receptors are residential properties along South Marine Drive and apartments overlooking the harbour, and hotels at elevated aspects.

2.54 The background noise survey carried out on 8 and 9 August 2000 is reported in detail in Appendix 8 of Document ERYC 2 using data gathered at seven locations in the vicinity of the harbour. It indicates that the noise environment at Bridlington is typical of a coastal resort with the main sources being traffic, activity in the harbour and quayside, and landward activities such as amusement arcades in the town itself. The main sensitive receptors to noise are those individual residential properties that have a direct line of sight to the harbour. It is generally quiet during the night; any new sources of activity at night are likely to compromise these background levels.

2.55 Regarding vibration, no sources have been discerned. However, people are often concerned that vibration might cause damage to their properties, and this matter is discussed later in this report, in Chapter 7, Paragraph 7.22.

Landscape and views

Landscape character

2.56 Bridlington is a traditional seaside town that became an elegant Victorian and Edwardian resort by the first decade of the 20th Century around an active harbour flanked by two extensive beaches and associated promenades. A landscape assessment report appears in Appendix 9 of Document ERYC 2. Architecturally, the urban environment is characterised by buildings of various periods, most of which are small in scale and of two or three storeys except for the ten storey Ebor House block of flats overlooking the harbour. Many of the buildings are run down and others have had shop fronts applied to them that are out of character with their original design. On the north side of the harbour there are small gift shops and a museum, and beyond an amusement area and fairground. Further to the north the extensive North Beach (also known as North Sands), mainly composed of sand with some pebbles, leads out of the town along the undeveloped coastline towards Flamborough Head.

2.57 Several imposing properties overlook both beaches. For example, in Marine Drive, to the south of the harbour and town centre, there are examples of well-maintained villas built towards the end of the 19th Century and beginning of the 20th Century, whose traditional features have been retained. Together with other notable properties, such as the Spa Theatre and Princess Mary Parade, they overlook the South Beach (or South Sands) and have extensive sea views against a background northwards and eastwards provided by the two harbour piers and Flamborough Head. This beach is part of a sandy seashore running for a distance of several kilometres southward from Bridlington in the direction of Spurn Head and the Humber Estuary. It is wider than North Beach and at present has fewer pebbles. The portion of South Beach in front of the Spa and next to the south face of the South Pier is wetter than the remainder partly because it is fed by freshwater springs than run on to the seashore in this area. South Beach is popular with families due to its width and sandy character, and it contains bathing huts and other traditional seaside resort attractions.

2.58 The harbour is the hub of the town architecturally and functionally. The piers, which are listed buildings, are prominent features that define clearly the limits of the harbour. They were the first major sea front development at Bridlington, built in the 1840s. There are no other piers or similar structures of significance in the coastal zone below high water mark ordinary tide ("HWMOT"). The population of the town more than trebled in the 19th Century due to sharp

increases in coastal trade. Nowadays, there is still much activity inside the harbour by pleasure and commercial craft that are moored on each side of the Chicken Run Jetty. The Commissioners filled up the western end of the harbour to the north of the Chicken Run Jetty, known as Clough Hole, to provide additional operational land and a car park. The Gypsey Race flowed out through the Clough Hole but now goes through a culvert in the filled area. Overall, the architectural and functional features of the traditional harbour have survived without dramatic change over the last Century. The relationship of the harbour to the town and its hinterland is shown in an aerial photograph taken in 1977, before the Clough Hole was filled in, reproduced in Document OBJ/210.

Views of the town and its immediate surroundings

2.59 A view of Bridlington from the end of its North Pier indicates a town that has a varied yet cohesive appearance with its small-scale buildings as it rises up gradually away from the sea. Despite Bridlington's obvious reliance on tourism with its associated seasonal fluctuations in economic prosperity, there remain echoes of a more prosperous and genteel past, and an intimacy not found in many seaside towns of this size. This is partly because the harbour has provided a focal point over the years, leading to a clustering effect. It is also due to the fact that the town's economic decline over the past 25 years has not provided the climate for the sort of insensitive developments and environmental changes which other seaside towns have been subjected to since the Second World War.

Visual receptors of the proposed scheme

2.60 The breakwaters of the proposed works would be similar in height and construction to those that form the existing harbour, namely the North Pier and the South Pier. From some viewpoints, notably from seaward, there would be little visual change as a result of building these structures. The ES maintains that from within the existing harbour the scheme would constitute an increase in the scale of the current facilities rather than a change. This statement relates to the so-called 'wet side' comprising the new outer harbour and the marina basin and the associated platform of land won from the sea and part of South Beach nearest to the South Pier. The Council refer to this platform as an area of reclaimed land. In fact it is a platform they propose to build on a pristine beach and in the sea and is made up of material imported from licensed sites off-shore. The ES does not deal with the proposals for a subsequent development on that platform of land, the so-called 'topside development'. This aspect was not a subject for investigation in the EIA or for report in the ES except by reference to the Council's indicative intentions for the topside. This matter is of considerable legal and procedural significance and was the subject of debate at the inquiries.

2.61 The ES states, it is areas to the south and west of the harbour that would be mostly affected. The platform of land, which would be the foundation upon which it is intended to build houses and other buildings comprising the topside development, is a major component of the proposed marina scheme. The topside development would be the subject of planning applications in due course of time. It is not possible to assess its visual effects at this time or even appropriate to attempt to do so. The ES essentially refers only to the proposed scheme described in the Works Order and not to any other proposed developments. Reports of environmental assessments of the effects of other development proposals that the Council may have in mind, such as for the topside, and which are not included in the Works Order, are outside the scope of the ES.

2.62 The main visual receptors of the proposed marina scheme on land are the South Sands (South Beach), Princess Mary Parade, the Spa, South Marine Drive, Pembroke Terrace, South Cliff Road, Ebor House, South Pier, Bridge Street, Queen Street and Prince Street, Harbour Road and North Pier. For example, there are hotels and houses behind the western footway of South Marine Drive that have clear views across the sandy expanse of South Beach out to sea, as well as towards the harbour which is situated against the background of Flamborough Head to the north east and east. From the sea, and main visual receptors are to the east and south of Bridlington.

Coast protection

2.63 Bridlington has a long history of sea front development and the subsequent need for protection from the energy and destructive power of the sea. The coastal defences are integral to the safety and livelihood of residents and commerce in the area adjacent to the sea front. Of particular relevance in terms of the proposed scheme are the defences in the harbour area and along the Spa Promenade and the Princess Mary Promenade. The future development and maintenance of these defences are described in detail in the recent Shoreline Management Plan ("SMP") and Coastal Protection Strategy ("CPS"), referred to in Documents ERYC 98 and ERYC 99. The frontage is distinguished within the Humber Estuary Coastal Authorities Group ("HECAG") SMP as Management Unit 2 ("MU2"), as shown in Document ERYC 102. There is a strategy for MU2, prepared in draft form in 1999-2000, which identifies coast defence requirements for the town for the next 50 years.

2.64 Due to the location and dimensions of the scheme, there are potential implications and issues for coastal defences in Bridlington, particularly to the south of the present harbour. It is therefore important that the engineering design of the scheme takes into account the recommendations made in the SMP and the CPS. In that context the ES reviews the historical development of coast protection in Bridlington and the nature and condition of the existing defences, and summarises the preferred options identified in the CPS.

Existing coastal defence structures, their condition and residual life

2.65 Bridlington is protected from the sea by four structures, namely the North Pier of the harbour, the South Pier, the Spa Promenade sea wall, and the Princess Mary Promenade. The piers are founded mainly on boulder clay. The structures are described in detail in various documents, and the piers are also considered in the assessment of my colleague Dr Moseley.

2.66 A condition survey of the defences was carried out in 1999. The principal findings are described below.

(1) The North Pier and South Pier are suffering from erosion, and parts of them are susceptible to undermining. In each case, residual structure life without maintenance is estimated as less than 10 years, but more than 50 years with maintenance.

(2) The Spa Promenade sea wall is generally in fair to poor condition. Parts of it are estimated to have a residual structure life without maintenance of more than 10 years, other parts more than 30 years, but more than 50 years with maintenance.

(3) The concrete block work of the Princess Mary Promenade is in fair to poor condition. The foundation level of the sea wall is not known; however, it is anticipated that limited fluctuations in beach levels would not threaten the integrity of the structure. There has been no recorded evidence of significant beach draw down or undermining. Residual structure life of the sea wall is estimated as more than 30 years without maintenance and more than 50 years with maintenance.

Preferred coastal defence methods

2.67 The preferred policy is to "hold the line" on the frontages currently protected. On the unprotected length of coast to the north of the town a "do nothing" approach is preferred except where changes are necessary to prevent out-flanking of the existing defences that safeguard the Flamborough Head SSSI. The methods recommended are summarised in Document ERYC 2. In the plans for the proposed marina scheme the South Pier would no longer act as a coast protection measure and would become part of an inner harbour. The Spa Promenade sea wall would not form part of the land water interface, as it would be fronted by a land reclamation scheme; therefore, the works necessary under present circumstances to secure the integrity of the sea wall in the longer-term would be redundant.

Traffic and access

2.68 Most of the construction materials would be brought into the site of the proposed scheme by boat but some road haulage would be needed. Road vehicle journeys from outside the built up area of Bridlington to the site would involve traffic passing through the town centre and residential areas. Four possible routes are assessed in the EIA, and three of them rejected as unsuitable, predominantly for environmental reasons.

2.69 The preferred route would approach the town from the south by way of the A614 and the A165, leading to South Marine Drive on the sea front opposite the site of the proposed works. That route is considered to have adequate capacity for traffic generated by the construction work associated with the scheme. Nevertheless, it becomes busy during the tourist season and it is lined in part by residential property, including those in South Marine Drive.

Tourism, recreation and navigation

2.70 The beaches, seaside attractions and shops make Bridlington a destination for day-trippers and staying tourists. Leisure and recreational activities, on-shore and off-shore, add to these attractions. In 1998 it was estimated that tourism was valued at approximately £130 million to the town in that year, and supported some 3,400 full-time and 4,700 part-time jobs.

2.71 The patterns of tourism use and prospects for further development are important environmental matters. A high proportion of staying visitors use self-catering accommodation, mainly static caravans, and some 75 per cent arrive by car. The most popular attractions are the sandy beaches and the sea and coastal scenery, in particular Flamborough Head. The seashore is much used for swimming, sunbathing and walking. The town is also well established as a venue for conferences and special event tourism.

2.72 The harbour area has many attractions such as shops, cafes, a museum and an aquarium. Boat trips for the public and charter vessels are available for sightseeing, angling, sub-aqua diving, bird watching and other near-shore activities. Other visitors bring their own craft - for yachting, windsurfing, jet skiing, sub-aqua diving and fishing. The Royal Yorkshire Yacht Club organise regattas. Over 40 yachts of differing sizes can be seen in the bay in the summer. Most of the boats are either moored in the harbour or launched on trolleys from the water park situated to the south of Bridlington at Wilsthorpe.

2.73 Bridlington is an important area for navigation, both in-shore and off-shore. The harbour is home for a medium-sized fishing fleet. The Royal National Lifeboat Institution operates two lifeboats from the frontage situated to the south of the harbour. The larger of these, a Mersey Class all-weather craft, is housed on the landward side of the main esplanade and launched from the South Beach after crossing the highway. The smaller boat is a D Class inflatable in-shore craft, housed in the southern section of the frontage beside the lower promenade, and is also launched from the beach.

Fisheries

2.74 Bridlington is an important port for shellfish landings locally, regionally and nationally. Lobster and whelk are the primary commercial species landed. The industry is estimated to generate £4 million per annum (1998 data) for the local economy. Some 62 per cent of this income is accounted for by the shellfish industry, while finfish generates only 35 percent, which is much less than the amount landed here some 10 years previously.

2.75 Bridlington is one of the main ports in the North Eastern Sea Fisheries Committee district. The other large ports are Whitby, Scarborough and Sunderland. It is the first ranked port in the district for shellfish landings and it is also important nationally, as some 22 percent of the UK lobster catch is landed here.

2.76 Every year, between May and September, there is a considerable amount of fishing from the 18 charter boats that operate from Bridlington Harbour. Some are used for 2-hour to 3-hour trips

while others take anglers to deeper waters off-shore. There is also recreational angling, especially in the summer months: local people and tourists fish from the South Pier, and on the beaches on either side of the harbour.

Archaeology and heritage

2.77 The Humber Archaeology Partnership have made a list of known sites and wrecks in the area (Appendix 11 of Document ERYC 2). The historic environment of Bridlington and the coastal area nearby is similar to that of other settlements along this part of the east coast of England in that erosion has reduced the potential for finding the remains of shipwrecks and historic landscapes within the foreshore. The coastline is representative of the archaeological development of the area, with sites from all periods occurring along the coast. No nationally important monuments exist near the site of the proposed works and the remaining features of interest are considered to be of local, and not of wider, importance.

The local community and economy - socio-economic and environmental benefits of the proposed scheme

2.78 The importance of Bridlington to the county of East Yorkshire is evident, as an economic and cultural centre and because of its attraction for tourism and recreation. However, trade and tourism have declined and there is a need for regeneration and diversification. The proposed marina scheme is seen by the Council as an opportunity to arrest the decline. The ES considers that the scheme would bring environmental benefits to the town including the provision of new and enhanced landscaping and improved highway infrastructure. There is a potential link with a proposed park and ride facility on the industrial estate at Carnaby, which is considered also as a means of bringing environmental benefit to the town.

Part 3

Chapter 3: adequacy and accuracy of the environmental impact assessment and the environmental statement

The parameters

3.1 The ES considers the potential environmental impacts that might arise in the construction and operation phases of the proposed marina scheme as described in the Works Order and accompanying plans (Documents ERYC 1 and ERYC 3). The significance of potential impacts is evaluated using a process that embraces consultations, field investigations, literature reviews and comparisons to existing standards, such as British Standards, as appropriate in each case. In those cases where potentially adverse impacts are identified mitigating measures are examined.

3.2 Levels of significance with respect to seven levels of impact under consideration in the ES are defined below and in Table 4.1 on Page 119 of Document ERYC 2. These definitions are used widely in the EIA process, and they are generally recognised as an acceptable basis for indicating the intensities of identified impacts on the environment.

negligible	Impact is only of slight importance but, nevertheless, acknowledged.
minor adverse	Impact is small scale and of little concern. It is undesirable but acceptable.
moderate adverse	Impact gives rise to some concern but is tolerable in the short-term. In some cases it may require further investigation.
major adverse	Impact is large scale, giving rise to great concern. It should be considered as unacceptable and may threaten implementation of the scheme
minor beneficial	Impact is small scale and provides some benefit to the environment.
moderate beneficial	Impact provides positive gain to the environment.
major beneficial	Impact provides large-scale benefit giving a significant, positive environmental gain.

3.3 The impacts referred to in the ES fall broadly into two categories: those associated with the construction of the proposed scheme, and those associated with the operation of the scheme after it had been built. They are identified, whenever possible, in this report with respect to each of the impacts considered. Underlining in the text is used to highlight the levels of significance recorded in the ES.

Cases of the parties with respect to the adequacy and accuracy of the EIA and the ES

The Council

3.4 The Council commissioned the EIA and ES in accordance with accepted procedures. They used the information gained, together with the results of additional studies by other experts, as well as the advice of their own professional staff to establish the environmental dimensions of the proposals in the Works Order. The ES is a basis for understanding aspects of the environment that would be affected by the proposed scheme and the nature and extent of the predicted effects. It forms a part of the Council's evidence before the inquiries. The relationship of the evidence gained from the EIA and that obtained outside that process, in some cases after the publication of the ES, is taken fully into consideration in my assessment as described in this report. The Council's expert witness is Ms Sian John, who holds a BA degree in geography and an MA in geomorphology. She is the Divisional

Director of Posford Duvivier Environment (now Posford Haskoning) and was the person primarily responsible for the management of the EIA and production of the ES.

Objectors

3.5 The Commissioners and other objectors criticise the EIA and the ES. Most of the criticisms concern the accuracy of the document, and they are dealt with in various sections of my report. However, an expert witness on their behalf, Mr A P James, raises fundamental objections and claims the ES has major inadequacies. Another of their expert witnesses, Mr S Hill, holds similar views.

3.6 Mr A P James is a partner in Barton Willmore Planning Partnership. He holds a BA (Honours) degree in town planning and an MA in economic and employment planning. He is a member of the Town Planning Institute and of the Institute of Environmental Assessment. His conclusions, following a review of the ES, are reported in Documents OBJ/P21and OBJ/AP23, and summarised in Sub-paragraphs (1) to (4) below.

(1) The ES does not seek to assess the environmental impact of the topside development works, which in his view is a major omission as it undermines the adequacy of the document and the assessment of impacts. He argues that the relevant EU Directive includes a requirement for EIAs to deal with any indirect or secondary effects.

(2) The assessment of impacts is based on indicative works, indicative plans and sections showing broad land uses for residential, retail, leisure and commercial uses, and levels that are yet to be confirmed. The guidance in Circular 2/99 makes clear that in dealing with planning applications it is necessary to have sufficient information available on which to judge the environmental effects of a proposal under consideration. He says that the legality of this approach has been significantly clarified in the Courts by the Rochdale cases (R *v* Rochdale MBC 1999 and 2000).

(3) There are contradictions between the ES and the Council's statement of case regarding descriptions of the proposed topside development.

(4) There are other inadequacies, as follows: no assessment is made of the impact of the marina and the topside land uses on the town centre; no details are given of the proposed low crested breakwater near the interface of the Spa Promenade and Princess Mary Promenade; no assessment is made of the impact of the proposed works on the historic harbour and listed buildings; no assessment is made of alternative sites for a marina; no researched assessment is made of the impact of the works on the sedimentary transport regime in Bridlington Bay and the effect on beaches and Smithic Bank; adequate research was not carried out into the availability of dredged material for reclamation works; and insufficient work was done to forecast the volume of dredging and bay disposal of sediment.

3.7 Mr S Hill, who is an associate at the Barton Willmore Planning Partnership, holds a degree of MA (Honours) in economics and politics and an MA in property valuation and law. He is a member of the Royal Institution of Chartered Surveyors. Mr Hill raises the same points as Mr James, complaining that the ES does not deal explicitly with the proposed topside development. He also indicates that there is an apparent difference between the ES and the Council's statement of case with respect to the description of the topside proposals (Document OBJ/P24).

3.8 Like Mr James, Mr Hill is also concerned that there would inevitably be a significant impact upon the character of the harbour, the adjacent environment and the wider townscape context if the proposed marina scheme is approved.

Responses to the Commissioners' evidence by the Council

3.9 The primary issue raised by Mr James, on behalf of the Commissioners, is that the ES is inadequate because of insufficient detail, and fails to consider the indirect effects of the proposed scheme, namely the topside development. Miss Frances Patterson QC, Counsel on behalf of the

Council, submits that the objectors have misdirected themselves as to what the proposed scheme before the inquiry is (Document APP/264).

3.10 She says the proposals for the proposed marina scheme do not include the topside development on the reclaimed land. That development is, therefore, not an indirect effect of the scheme. She draws attention to guidance in Paragraph 82 of Circular 2/99 regarding the importance attached to preparing environmental statements on a realistic basis and without unnecessary elaboration. She also refers to Court judgments by Lord Hoffman, in 2000 and 2001, and Justice Sullivan in the Rochdale case, in 2001, regarding the interpretation of the Transport and Works Act rules, which are partially taken from the EC Directive 85/337/EEC on environmental impact assessments.

3.11 Counsel submits that it is clear from the judgment of Sullivan J. that the development to be assessed is that which it is proposed to be carried out and not some other. That is the distinction drawn between what has been referred to as the wet side development and the topside development. So far as the latter is concerned it is not part of the scheme proposals before the inquiries. To seek full details of that development at this stage therefore is misconceived as a matter of law.

3.12 Regarding the objectors' argument that the topside development is in fact an indirect effect of the proposal before the inquiry for the marina and associated works, Counsel says that is to take too fanciful an approach to the use of the word indirect. The topside works would follow subsequent to the construction of the marina scheme and would be subject to their own environmental statement. In that way the requirements of the EC directive and the Town and Country Planning (Assessment of Environmental Impact) Regulations 1999 would be met. What the objectors have done, she submits, is to conflate and confuse indirect effects with the description of the development proposed.

3.13 Regarding the indicative nature of the works (Paragraph 3.6, Sub-paragraph 2, above), Ms John responds saying her evidence to the inquiries covers the potential impact of the proposed marina scheme on the environment. Sufficient detail was provided to the EIA team to enable them to establish the principal effects of the scheme and for any significant impacts to be identified and quantified, in line with the Judge's ruling in the Rochdale 2 case. The works that are the subject of the Works Order were sufficiently detailed to allow significant environmental implications to be assessed, in accordance with EIA guidelines. She draws attention to exchanges of letters between the Council and the Environment Agency, English Heritage and English Nature confirming that these statutory agencies are satisfied that the EIA and ES are adequate. Copies of the letters appear in the appendices to Document APP/RP53 together with a tabular appraisal of Mr James's review of the ES.

3.14 Regarding contradictions (Paragraph 3.6, Sub-paragraph 3, above), Ms John states that the details provided within the ES of the proposed topside development were contextual assumptions only and not material to the assessment of the environmental implications of the Works Order. The specific reference to 1200 housing units postulated for the topside is included in order to calculate the maximum flood source prediction for potential surface run-off rates over around 35 per cent of the available development space. The proposed number of housing units for the reclaimed land is actually expected to be 240 to 310, based on 6.0 ha to 8.0 ha allocated for housing at a density of up to 40 units per ha. The figures provided in the ES represent a site capacity assessment largely for the purpose of prediction for potential drainage, while the figures in the Council's statement of case represent the outcome of market assessment and research. For these reasons the apparent reduction in the size of the topside development is not relevant particularly in the context of the site assembly for the Works Order. The mix of development now proposed by the Council includes more land for public space and less for housing. There is no substantive contradiction between the two statements with respect to the essence of the topside proposals.

3.15 Regarding Paragraph 3.6, Sub-paragraph 4, above, the other inadequacies referred to by objectors, Ms John responds as follows.

(1) By the time of the inquiries, engineering experts had demonstrated to the Council's satisfaction that the influence of the proposed scheme on the South Beach would be localised

and it was unnecessary after all to build a detached low crested breakwater. This mitigation proposal was abandoned in November 2000 but was still intended when the deposited plan was drawn.

(2) Regarding impact on the historic harbour and listed structures the Council's response is dealt with in the report of the listed buildings assessor, Dr Moseley.

(3) The requirement in the EC directives for the developer to include in the ES an outline of the main alternatives considered, and the main reasons for the choice, have been satisfied.

(4) Since the submission of the ES, research into the impact of works on the sediment transport regime in Bridlington Bay has been developed and the potential implications for the shoreline and Smithic Bank assessed. It is described in the Council's responses to the objectors. It validates the initial coastal process studies upon which the assessment of impacts reported in the ES was based. The statutory agencies referred to in Paragraph 3.13, above are satisfied that there is adequate detail upon which to make a decision.

(5) Over 95 per cent of the material to be used to build the platform of land in the scheme would be derived from an off-shore commercial source, and its suitability determined before purchase through reference to the Crown Estates Commission's database. The remainder would arise from the dredging works in the entrance channel to the proposed new harbour.

(6) Sufficient work was carried out in the preparation of the ES to enable forecasts to be made of the volume of dredging expected to be required so as to consider the potential environmental implications of the maintenance works. New information provided to the inquiries by the Harbour Commissioners that indicates higher existing maintenance dredging rates has not materially affected the findings of the ES in terms of the potential implications of disposal for the Flamborough Head cSAC, the area which contains the FEPA 1985 HU015 disposal site. This conclusion is validated in a review by the Centre for Environment, Fisheries and Aquaculture Science ("CEFAS") of the Commissioners' disposal licence, which found no significant cause for concern that would prompt imposition of a restriction in the disposal rate allowed.

3.16 The points in Mr Hill's evidence are substantially the same as some of those made by Mr James, and the Council respond accordingly.

Findings

3.17 Counsel for the Council submits that Mr James is incorrect in expecting the EIA to cover the indicative topside development that it is intended to promote if the proposed marina scheme is approved (Document APP/264). Recent Court judgements appear to support her views on the adequacy of the EIA and ES in that respect, in that detailed specifications for the proposed topside development could not, legally, become part of the Transport and Works Act Order. The topside needs a planning application under the town and country planning legislation, and an EIA at that stage. However, she claims that the Development Framework for the topside, described in Appendix 1 of Document APP/AP28, provides information that is of some relevance to the EIA of the proposed marina scheme. The ES in turn refers to the potential for a topside development and recognises the need for a separate EIA if a planning application for that development is made in due course. Severe limitations are placed on the environmental assessors of the proposals in the Works Order because of the uncertainties surrounding the topside. I consider, however, that the ES before the inquiries stands alone as an adequate basis for assessing the impacts of the proposed marina scheme on the environment in accordance with the requirements contained in the various rules and Circular 2/99.

3.18 I find that the Council have carried out their duties in accordance with the legislation and the procedures by providing the environmental information and assessments with respect to the Works Order. The ES is adequate, in general terms, to provide the Inspector with sufficient advice to enable him to make recommendations to the Secretary of State. There is no requirement for the Council to

assess the effects of the indicative topside development on the land reclaimed as part of the proposed marina scheme. In any case, the information available in the Development Framework at the time of the EIA, and indeed at the inquiries, about the nature and extent of the topside development is, inevitably, incomplete and inadequate for the purposes of an EIA. It is not possible for an EIA to be carried out of that indicative development proposal. However, I do recognise that the topside proposal, such as it is, has not been ignored in the preparation of the ES.

3.19 Ms John deals in some detail with technical matters. My overall impression is that the EIA team carried out an assessment that, in general terms, meets the standards expected of an ES. I find some sections of the ES are more adequate than others, and where weaknesses are apparent they are discussed in appropriate parts of my report. They are mainly concerned with the manner in which the EIA data are interpreted by the Council with respect to impacts of the works proposed in the Order on landscape and views. These concerns do not bring into question the adequacy of the ES as a document that provides information on the potential impacts of those works on the environment, but they do raise questions about the Council's responses to certain aspects of the findings of the EIA.

3.20 The responses of Ms John (Paragraphs 3.13 to 3.16, above) to the specific matters raised by Mr James, summarised in Paragraph 3.6, above convince me that the EIA and ES are adequately detailed with respects to those matters. I am encouraged in that view by the opinions of the Environment Agency, English Heritage and English Nature (Appendix to Document APP/RP53). These statutory agencies do not indicate that the ES is inadequate. I make no observations on listed structures and the historic harbour, as Dr Moseley considers these matters separately in her report.

Part 4

Chapter 4: effects of the proposed marina scheme on the coastal regime in the study area

4.1 The principal works in the scheme, shown on the plan in Sheet 2 of Document ERYC 3, include two rock armour breakwaters (Work No.1 in the Works Order, 0.56 ha), the peninsular structure between the South Pier and the lock to the marina basin (Work No. 2, 1.91 ha), the main area of reclaimed land to the south the South Pier (Work No. 5, 13.7 ha) and the other reclaimed area to the north of the South Pier, in the existing harbour (Work No. 6, 1.01 ha). The reclaimed land would be developed over a period of time that may span 10 years, but the works described in the Order would take about 30 months to construct. The total area of developable land would amount to 17.2 ha. The area of beach and in-shore water that would be involved in the footprint of the proposed scheme amounts to 20 ha. The scheme entails depositing imported material to build the platform of reclaimed land that would subsume the bulk of the south face of the South Pier as well as a length of the promenade for a distance of approximately 550 m between the root of the South Pier and the root of the southern breakwater. The distance from the root of the southern breakwater to the seaward end of the eastern breakwater would be approximately 900 m. The southern breakwater would extend from the Princess Mary Promenade eastward into the beach and the sea in a straight line for a distance of 620 m, and then curve northward ending in a pier head approximately 140 m to the south of the North Pier.

4.2 The ES contains reports on the effects of these works on the coastal regime and deals with local wave climate, tidal currents, sediment transport and the integrity of the Flamborough Head cSAC. Potential impacts on the environment during the construction and operation phases are summarised in Table 5.1 on Pages 199 to 211 of Document ERYC 2. The ES also reports on matters raised in consultations with regulatory bodies and other organisations involved with the environment in the area; and on the conclusions of a review of coastal and sediment transport processes carried out in the context of the engineering parameters of the scheme.

4.3 The Council submit evidence by expert witnesses from a variety of engineering, hydrographic, geological and other disciplines involved in marine and coastal zone studies that have been engaged in

preparing the proposed scheme and the orders before the inquiries. The evidence was produced by the Council's own staff, experts in Posford Duvivier Environment, Bullen Consultants and other sources, including published papers.

Conclusions of the Council regarding a coastal review of the study area following consultations carried out with interested parties

4.4 Responses to the consultations between the Council and interested parties, referred to in Paragraph 4.2, above, are taken into consideration in an appraisal of the coastal regime in Appendix 5 of Document ERYC 2, entitled *Review of Coastal and Sediment Transport Processes*, and summarised below.

(1) Seaward and to the north of the new eastern breakwater of the scheme the wave climate would not be adversely affected.

(2) To the south of the site of the works the promenade changes orientation, which might lead to some focusing of waves at the South Beach.

(3) To the north of the existing harbour, reflected wave energy from the new eastern breakwater of the scheme could combine with that from the existing North Pier. This process could cause readjustment of the North Beach for a distance affecting up to four of the groyne bays in this area.

(4) The impact on the current sediment regime would be likely to be minimal, as the site of the scheme would be located in an area of weak currents being in the shadow of Flamborough Head.

(5) The scheme would not affect the areas of concern to English Nature to the north of Bridlington and around Flamborough Head.

(6) The scheme would not affect Smithic Bank, which would continue to supply sediment for the beaches of Bridlington.

(7) In one of a pair of scenarios considered in the ES, potential drift is realised and some realignment of the beach to the south of the site of the scheme would be expected.

(8) The implications of the scheme for the sediment regime as a whole, and particularly the shoreline of the Holderness Coast, would be slight, and no changes to the Humber Flats are expected to arise.

4.5 The issues raised in the consultations were considered in the EIA, particularly the effects of the scheme on the coastal regime, but all of the questions posed cannot be assessed without further investigations. For example, in response to questions posed by the MAFF, it is acknowledged that there would be impact on flood defence and coastal protection, but it cannot be quantified before full design studies and beach plan modelling work have been carried out.

Construction effects on local wave climate, tidal currents and sedimentary transport

Wave climate

4.6 The ES states, the impact on the area to the north of the site of the proposed works would be expected to be at a *negligible* level of significance. However, some localised wave focussing may possibly occur on the sea wall at the interface between the Spa Promenade and Princess Mary Promenade, which would result in the lowering of the beach if left unchecked thereby causing an impact at a *moderate adverse* level of significance. A detached low crested breakwater, shown on plans in Figure 2.1 in Document ERYC 2 and in Document OBJ/133, had been put forward as a mitigation measure to reduce such wave activity to levels that would be no greater than those experienced already. This measure is now deemed unnecessary as a result of additional studies carried out since the EIA was completed. Minor benefits would arise from the reduced reflectivity

and increased energy absorption of the rock armour breakwaters planned for the scheme compared with the effect on wave behaviour of the almost vertical walls of the existing harbour. Beyond Princess Mary Promenade no discernible difference would be expected in the height of waves approaching the coastline as a result of the scheme.

Tidal currents

4.7 Using vector plots for the Yorkshire Water model, described in Chapter 2, Paragraph 2.18, it is possible to estimate the impact the proposed works would have on tidal currents and, therefore, potentially on the movement of sediment. For all the cases examined in the EIA, the ES indicates that the vector plots show very weak current velocities along the coastline. The structures would protrude 150 m beyond the line of the existing harbour. The Yorkshire Water model data suggest that the scheme would not cause substantial disruption to the pattern of flow, and the level of impact likely to arise is therefore at a *negligible* level of significance.

4.8 It is anticipated that a similar feature to the existing sandy feature near the entrance of the harbour - the Canch - might form off the tip of the northern breakwater (Chapter 2, Paragraph 2.15). Such a feature would, in turn, contribute to the bypassing of sediment across the mouth of the new approach channel. The alignment of the southern breakwater in this area is indicated as parallel to that of the existing harbour arm and, therefore, it is unlikely to lead to any major flow divergence.

Sediment transport

4.9 Three aspects are involved: they are long-shore transport of sediment, wave-focussing at the root of the breakwaters, and breakwater reflectivity. Concern has been expressed by objectors regarding each of these aspects, especially the effects of the proposed scheme on long-shore transport of sediment.

Long-shore transport of sediment

4.10 Computations reported in the ES indicate a potential long-shore drift of sediment that is not insignificant albeit distributed over many hundreds of metres seaward. The two profile diagrams in Figure 4.4 of Document ERYC 2 demonstrate that the scheme may intercept the flow of approximately 28 per cent of the net potential drift across one of the two profiles, and 32 per cent of the net potential drift across the other profile, giving an average of 30 per cent for the two values given. It is argued that because it is directed from north to south the intercepted drift would tend to result in a build up of sediment and hence an advance of the shoreline on the updrift (north side of the site of the proposed scheme) accompanied by a retreat of the shoreline on the downdrift (south side of the site of the scheme). However, there is no evidence of this advance and retreat process happening with respect to the existing harbour.

4.11 If the potential drift were to be realised it is stated that possibly the greatest concern would be the potential for erosion on the south side of the site of the new breakwaters in the scheme. The extent of such erosion along the coast could be of the same order typically as the seaward extent of the new breakwaters. However, it is thought this estimate may be pessimistic given the comparatively benign influence of the existing harbour on the visible beach area.

4.12 It is considered that two aspects of the situation are important. First, the new harbour created by the new breakwaters would result in the removal of a length of existing beach, namely part of South Beach, but would not eliminate any sustainable source of sediment as the length of beach in question is backed by an existing sea wall. Secondly, although the percentage of potential drift interrupted would be of the order of 30 per cent, a substantial part would be unaffected and would continue to feed the downdrift beaches.

4.13 The ES states that the physical factors reported above indicate that the scheme would have an impact at a *minor adverse* or *negligible* level of significance on long-shore sediment transport behaviour. If the potential drift were not realised through lack of material supply the scheme would have an impact at a *negligible* level of significance on long-shore transport behaviour.

Wave focussing at the root of the new breakwaters

4.14 The change to the alignment of the sea wall brought about by the building of the scheme would lead to the focussing of wave energy at the root of the new breakwaters due to the interference of reflected waves. The effect would also be localised, as described in Paragraphs 4.4 and 4.6, above.

Breakwater reflectivity

4.15 An area of localised beach erosion exists to the north of the North Pier of the harbour, which extends to affect two or maybe three groyne bays. It is attributed to the focussing of waves at the root of the North Pier. Although the scheme would not result in changing the geometry at the root of the pier it might be expected to worsen the conditions there slightly by containing, on the north side of the harbour, some of the wave energy, which currently bypasses this area as it progresses towards the South Beach. Such an effect would however be mitigated by the nature of the rock armour of the new breakwaters, which would be less reflective to waves than the existing harbour piers. No quantitative measurements have been made of the extent of breakwater influence on sediment transport to the north of the harbour, but an estimate is given that the existing erosion area would be no more than doubled in size, affecting some four groyne bays instead of two or three as at present.

Integrity of Flamborough Head cSAC with respect to wave action, tidal currents and sediment transport

4.16 The localised changes to beaches to the south, and to a smaller extent to the north, of the site of the works would not extend to any of the terrain designated in the cSAC around Flamborough Head. Moreover, seaward and to the north of the eastern breakwater in the scheme the wave climate would not be adversely affected since the new structure would be less reflective than the existing harbour walls. The ES states, the impact on the cSAC would be at a *negligible* level of significance, as this special area is located to the north east of the development site and outside its zone of influence. Of specific significance in this respect is the effect the works may have on current flows, which would be minimal due to its location in an area of weak currents and because the net long-shore movement of sediments is in a southerly direction.

Cases of the parties regarding the effects of the proposed scheme on the coastal regime in the study area, particularly local wave climate, tidal currents and sediment transport

The Council

4.17 The Council maintain that any development inherently changes the physical and visual nature of an area (Document APP/P20). They consider that when all the environmental parameters have been taken into account, the proposed works can be shown largely to have a short-term effect and a relatively minor degree of adverse environmental impact on the coastal regime. The potentially significant adverse impacts identified in the ES can, in many cases, be avoided, reduced or minimised through the successful implementation of mitigation measures. Detailed specifications would be prepared by the Council and included within contracts for any work that may be carried out involving mitigation measures.

4.18 In conducting the EIA and preparing the ES Ms Sian John relied on the specialist knowledge of expert witnesses, mainly colleagues at Posford Duvivier. With respect to the effects on the coastal regime Mr I Cooke is the relevant specialist.

4.19 Mr Cooke is a principal engineer in the Coastal and Rivers Division of Posford Duvivier, responsible for the day-to-day activities of the coastal modelling section. He holds a Master's degree in Civil and Coastal Engineering and is a chartered member of the Institution of Civil Engineers. His evidence (Document APP/P17) is based on six principal studies of Bridlington Bay carried out before the submission of the orders, and subsequently, and they address the issues and the concerns of the interests consulted and objectors. The studies involved are a numerical modelling report (Document ERYC 72), a review of coastal and sediment processes (in Document ERYC 2), hydrographic survey

(Document ERYC 71), water quality assurance (Document ERYC 70), and a review of geomorphology and of modelling of the sediment transport process (Document APP/AP19).

4.20 Mr Cooke draws the following conclusions from the studies.

(1) Waves approaching the coastline in the area would not be affected by the construction of the proposed works.

(2) The concerns of the Commissioners about the surge conditions in the harbour are unfounded.

(3) Sediment circulation is maintained in the bay as a whole, and the beaches at Bridlington are healthy and accreting.

(4) Changes in bed shear stresses are small; therefore the stability of the foreshore and the Smithic Bank is not threatened.

(5) The scheme would cause a small degradation in water quality; however, that degradation would fall well within the maximum allowable limits accepted by the Environment Agency with the inclusion of tertiary treatment at the sewage works.

Objectors

4.21 There are three groups of objections relating directly to the environmental effects of the works on the coastal regime. They are those made on behalf of the Commissioners; the objections by Mr M Terrell, who is an independent marine consultant; and those made by other individuals. The Commissioners produce four expert witnesses to deal specifically with technical aspects of the effects on coastal processes, namely Dr A Brampton, Mr T N Burt, Mr C J Wright and Mr W H Trevitt. The substance of these objections is reported in that order of sequence.

4.22 Mr Terrell's statement of case and proof of evidence are accompanied by several essays. Although presented as part of the objection of an independent person, his evidence is also relied on by the Commissioners, as indicated in their statement of case (Documents BPHC 5 and BPHC 32).

4.23 English Nature, appearing as an interested party, give advice to assist with the issues arising from statutory designations of coastal zone and marine environment in the area around Flamborough Head.

4.24 The responses of the Council's expert witnesses to the evidence of objectors and the contributions of English Nature are then reported.

The Commissioners

Dr A H Brampton

4.25 Dr A H Brampton is a Technical Director in HR Wallingford, which is a private company limited by guarantee and a research association that was previously known as the Government's Hydraulics Research Station. He submits evidence as an expert witness on the effects the works may have on coastal processes, particularly with regard to the South Beach at Bridlington and the movement of sand over the sea bed in Bridlington Bay (Document OBJ/P19).

4.26 The evidence presented by the Council in support of the scheme does not provide a satisfactory description or quantitative rates of present day patterns of sand transport along the beaches or over the sea bed in the bay. Neither does it provide a satisfactory prediction of the effects of the scheme on the adjacent beaches.

4.27 The works would be expected to cause the levels of the remaining part of South Beach to be lowered, reducing the amenity value of this beach and increasing the risk of damage to, and wave overtopping of, the Spa Promenade sea wall. No detailed study of these adverse effects has been carried out. Such changes could require the installation of expensive coastal protection measures.

The design, cost and funding arrangements for such works have not been identified or taken into account in economic or environmental assessments of the proposals for the marina.

4.28 There has also been insufficient study of the effects of the works on tidal currents and the sand transport they generate over the sea bed and the lower, sub-tidal parts of the beaches, especially the movement of sand on the Smithic Bank and its relationship with the beaches at Bridlington. Because of this deficiency it is not possible to rule out the possibility that the construction of the scheme would have adverse effects on North Beach or on Smithic Bank.

4.29 Dr Brampton also gave an appraisal of the effect of the scheme on the Canch. This matter is dealt with separately in Paragraphs 4.64 and 4.65, below.

Responses to Dr Brampton's evidence by the Council

4.30 Following studies carried out subsequent to the submission of the orders, the Council's consultants have shown to the satisfaction of the Environment Agency and English Nature that the impact of the proposed works, if constructed, on Smithic Bank would be marginal. The additional studies have also revealed that water quality would be acceptable and that effects on beaches would be localised (Document APP/RP52).

4.31 The impacts of the scheme on tidal currents are addressed through the work done by Bullen Consultants, which is described in Appendix B of Appendix 5 in Document ERYC 2. The results of their studies show that the impacts would result in changes in tidal velocity of less than 0.1 metre per second ("m/s"). There would be changes in shear stresses, which are generated by the tidal currents. Bullen's tidal current models show that the highest area of resulting erosion would appear at the head of the new eastern breakwater, and that in the lee of the new southern breakwater there would be accretion of beach level, not a lowering of beach level as suggested by Dr Brampton. The Council agree with Dr Brampton that the localised problem of low beach levels arises as a result of waves reflecting from the south wall of the harbour, but this is in direct contradiction to the view held by Mr Terrell, whose evidence the Commissioners would rely on according to their statement of case.

4.32 English Nature, who are also concerned that the construction of the scheme would interrupt the supply of sediment to the beaches and the Smithic Bank have also considered the issue of sediment movement. Appendix 1 of Document APP/AP19 shows that the pattern of sediment movement is maintained, in direction and magnitude, leading to the conclusion that the movement of the sediment would not be diminished and therefore any changes to the beaches are likely to be localised. Moreover, the Council would be monitoring the beach levels before, during and after any construction work associated with the scheme to assess beach response.

4.33 As indicated in Chapter 3, Paragraph 3.15 (1), further studies demonstrate that the detached low crested breakwater referred to by this witness and others is no longer required. Regarding the estimated costs of mitigation measures, which Dr Brampton queries, the Council say they are included in the contingency sums relating to the scheme.

4.34 The consultants have considered the adequacy of the studies and additional modelling has been carried out. They do not agree with Dr Brampton's view that sediment transport by tidal currents in combination with wave action has not been studied, or that tidal currents have been underestimated. The results of their additional studies were discussed with English Nature and their expert, Professor J S Pethick, who accept the work as being sufficient to inform the ES. They also accept the Council's conclusion that wholesale changes to the sediment regime would not occur and that the cSAC would remain intact following construction of the works. The Council submit that sufficient is known, on the basis of work already carried out about how the scheme would affect the sediment regimes within Bridlington Bay, for judgments to be formulated that would enable their proposals to be approved in so far as these marine environmental matters are concerned.

Mr T N Burt

4.35 Mr T N Burt's evidence primarily concerns assessment of wave climate, tidal currents and the sedimentation issues that would arise if the scheme were constructed (Document OBJ/P20 and Addendum). This expert witness is the Principal Engineer in the Estuaries and Dredging Group of HR Wallingford. The study he was asked to carry out by the Commissioners involved the use of the software SEDCALC that requires inputs of data for wave climate, current regime and sediment type. He visited Bridlington Bay on 20 August 2001 and obtained 13 samples of the sea bed material, close to the sites of the proposed breakwaters of the scheme, some 600 m to 700 m off-shore. He produced a plan showing the location of his sample positions and a sketch of the breakwaters, as well as tables containing data relating to the sizes of particles collected in the samples of sedimentary materials.

4.36 Mr Burt describes tidal flows, waves, bed materials, harbour bed samples, suspended solids, dredging, and sediment input from the Gypsey Race. He includes data as well as analyses and appraisals of these various parameters.

4.37 In Section 3 of his proof of evidence, he examines the sedimentation processes that would occur if the works were constructed, and identifies the following processes which may cause sedimentation in the area.

(1) Sand suspended from the sea bed near the entrance to the proposed outer harbour resulting from the combined action of waves and currents would be deposited in the shelter of the extended northern breakwater. He estimates that the annual rate of sedimentation at the new entrance would be between 4,500 m^3 and 18,000 m^3.

(2) Re-formation of the Canch would take place after some time but probably at a lower level than at present (Paragraph 4.65, below).

(3) Fine material, that is silt, would be carried into the existing harbour and the proposed outer harbour by the Gypsey Race. He expects the existing harbour would silt up at the same rate as it does at present, that is, about 8,000 m^3 per annum. He estimates that half of this quantity is due to the sediment load of the Gypsey Race and the other half made up of marine deposits.

(4) Fine material would be carried into the proposed outer harbour and marina, and the existing harbour, by the flood tide. He estimates that the outer harbour would silt up at a rate of 7,000 m^3 per annum. Of this quantity, 4,000 m^3 per annum would be due to the Gypsey Race sediment load, while 3,000 m^3 per annum would come from marine sources. The rate of siltation in the proposed marina basin would, he suggests, be of the order of 1,400 m^3 per annum.

(5) Scouring of sediment in the entrance to the existing harbour and the entrance of the outer harbour would take place through the action of the Gypsey Race and the ebb tide.

4.38 By taking the upper values of his predicted rate of sedimentation for the entrance to the outer harbour, Mr Burt estimates an annual sedimentation rate of 34,000 m^3 could be expected. His estimate does not take into account the possible need to dredge the Canch after it re-forms. He also notes his estimate of 34,000 m^3 would exceed that included in the current annual dumping at the FEPA 1985 HU105 sea disposal site (Chapter 2, Paragraph 2.47). However, he stresses that this estimate is based on limited data and has not included any modelling of waves or currents.

4.39 His review of the ES indicates that the EIA appears to have overlooked a number of potentially important mechanisms of siltation. He believes the oversight has led the EIA to under-predict the magnitude of the sedimentation problems that the operators of the proposed marina would have to deal with if the scheme goes ahead. He refers in particular to the quantities of sediments involved, the associated costs and the limitations of the existing sea disposal FEPA licence. The ES does not adequately address the sedimentation aspects, which he regards as potentially more serious than described.

Responses to Mr Burt's evidence by the Council

4.40 In Document APP/RP52 the validity of several aspects of Mr Burt's evidence is challenged by the Council, for example, whether 13 samples taken on one day is a reliable basis for analysing sedimentation on the basis of sea bed samples. Mr Burt's use of some of the other data in his proof of evidence is also criticised because they are of doubtful accuracy. Some of his appraisals are considered to be speculative and not derived from an adequate database.

4.41 In Document APP/209, prepared and submitted after cross-examination of Mr Burt, the Council say that the calculations he carried out relate only to the proposed outer harbour. He presents no further calculations in support of the sedimentation in the existing harbour. It has been shown that these calculations are based on supposition, and that any estimate of the sediment contributed by the Gypsey Race must be based on knowledge of the specific catchment and not on typical values. Document APP/209 contains detailed appraisals of sensitivities of volumetric transport rate to changes in parameters, dealing specifically with input variables. It also deals with calculation of sediment volume in the approach channel. Data for volumetric transport at various states of the tide are given.

4.42 It is concluded in Document APP/209 that sediment transport calculations are sensitive to the environmental parameters used. It is therefore important, when making a critique of the work of others, that the values used in the calculations are representative of conditions at the site. While Mr Burt's calculations were made on the basis of sediment samples obtained at the site of the proposed development, the conclusions that he draws with respect to the volumes of sediment attracted to the proposed outer harbour are flawed.

4.43 The results presented in the tables in Document APP/209, and the subsequent calculations, have led the Council to conclude that, by using the same software and approach adopted by Mr Burt, along with more realistic figures for the sediment particle size and tidal currents, it has been demonstrated that the estimate of dredged material to be removed is comparable with the 17,200 tonnes given in the ES (Section 2.3.2 of Document ERYC 2). The Council assert that Mr Burt's criticism of the ES in this respect is therefore unfounded.

Mr C J Wright

4.44 Mr C J Wright has been the Harbourmaster of Bridlington Harbour since 1999, and employed by the Commissioners since 1995. His experience of the harbour and its operations has been gained in his capacity as a fishing boat owner and skipper for some 25 years before 1995, and he holds a Master's Certificate and a Royal Yachting Association Certificate of Competence.

4.45 Mr Wright, in his proof of evidence produced on behalf of the Commissioners (Document OBJ/P3), expresses concern about the effects of the proposed works on such matters as tidal surge, the interests of the fishing industry, notably shellfish, and other practical issues involved in the smooth running of a harbour. He also deals with its effects on the environment, especially sediment dredging and the role of the HU105 disposal site, and his evidence on those matters is summarised below.

4.46 The new breakwaters in the scheme are to be constructed using rock armour, while the piers of the present harbour are made up of solid vertical walls. These walls have allowed the movement of sand, but Mr Wright considers that the rock armour of the new breakwaters would trap the sand and become a slope and no longer a sea break. He also argues that this environmental change would make entry to the harbour perilous save in the lightest weather. Similar matters are raised by Mr B H Rodgers in his evidence (Document OBJ/P1).

4.47 He refers to the FEPA 1985 licence for the HU105 disposal site, and to quantities dumped over the years between 1977 and 1989 (Document OBJ/ 130), and between 1988 and 1998 (Document OBJ/131). The quantities allowed have varied, and came down from 30,000 wet tonnes to 20,000 in 2001 following consultations between the Environment Agency and English Nature. The reason given is that the dumping site is situated on the edge of the cSAC. However, the location of the site is perfect for carrying spoil straight out of the bay. If the scheme were to go ahead a very large amount

of spoil would need to be removed annually from the entrance to the new harbour in addition to the dredging of the existing harbour. As the MAFF had already reduced the licence for dumping in the HU105 disposal site by one third this would not in his opinion be possible.

Responses to Mr Wright's evidence by the Council

4.48 Document APP/RP52 explains that where rock armour is used as a protective revetment at the base of a beach to prevent erosion of a cliff, dune system or the beach itself, the natural movement of sediment as a result of wave action does allow material to become lodged in the voids. In the deeper water at the toe of the rock armour structure of the new eastern breakwater it is expected sediment would accumulate. This is perfectly natural. However it does not diminish the effectiveness of the new breakwaters in absorbing waves and reducing run-up. Waves breaking on a rock armour breakwater dissipate their energy as the water passes through the voids in the structure. This would take place in the Bridlington structures, even if the Canch reforms.

4.49 The additional quantity of dredging needed for the proposed scheme would not result in the total amount of material exceeding 30,000 tonnes, which was the limit of the previous FEPA 1985 licence for the HU105 disposal site that remained in force until 2001. Furthermore, there is no evidence to indicate that the previous licence had any adverse impact on the integrity of the cSAC. At the detailed design stage of the scheme alternative means of disposing dredged material would be considered but there is no reason to believe, on the basis of existing predictions, that it cannot be dumped in a satisfactory manner at an appropriate location.

4.50 A set of data obtained from a table in a CEFAS report, held by the DEFRA, for the years between 1989 and 2000 are given in Document BPHC 29. They show considerable variation in the reported quantities of material dumped at the HU105 disposal site. However, the report says that these sources of material for dumping do not suggest any significant cause for concern that would prompt a restriction to the current disposal rate. CEFAS recommend that the situation should be reviewed if there is (1) a request to dump more than 20,000 tonnes a year at this site, or (2) changes in disposal methods are suggested, or (3) information is gathered during monitoring of the condition of the HU105 disposal site, or from the cSAC Management Group, to suggest that there is an increased risk of impact on the cSAC.

Mr W H Trevitt

4.51 Mr W H Trevitt is a civil engineer who has extensive yachting experience. He is a consultant to the Commissioners and his proof of evidence and supplementary papers, produced on their behalf, cover a wide range of matters of concern arising from the proposed scheme (Document OBJ/P27).

4.52 His evidence relates to maintenance of the harbour, the fishing fleet and their facilities, water quality, recreational boating and yachting, the use of rock armour, dredging, and the effects of the proposed scheme on the Canch and the beaches and other features in the area. He also produced a paper and a diagram showing the historical movement of the Smithic Bank between 1685 and 1977 (Document OBJ/187). Aspects that directly involve impacts on the environment are summarised below.

4.53 He expresses grave concern about the clear and agreed risk to marine vessels of the re-formation of the Canch, combined with the obvious risk of failure of the dredging regime, however temporarily. These risks would make it necessary to allow an additional under-keel clearance for boats using the harbour. The Council's estimated requirements in that respect do not err on the side of caution. He considers these are matters that have been totally ignored by the Council.

4.54 Mr Trevitt also estimates that some 15 ha of existing drying beach would be lost to the town. Moreover, the very large volume of rock armour not regularly immersed by the tide would be deposited, which would become infested with rats. He is particularly concerned that the proposed works, if they come into being, would involve control of rodents as a major item of maintenance; and also expresses concern about danger to children on the beach.

Responses to Mr Trevitt's evidence by the Council

4.55 Mr A R Parker, the Council's engineering consultant and expert witness responds in Document APP/RP51. Regarding under-keel clearance in the proposed new harbour, access for smaller vessels could be expected almost all of the time and the situation would be greatly improved for the larger vessels. It was never intended that all vessels regardless of size should be able to gain entry at all times.

4.56 Regarding concerns about rock armour, the structures are not required to extend sufficiently above the splash zone for rats to build nests. Rock structures at an intermediate level can be in-filled to prevent rats nesting in them. These structures are common around our coasts and the Council have not heard of a particular problem with rats at any other location. It is accepted all rock structures can be a danger to children but they are now to be seen on many tourist beaches as well as harbours.

Mr B H Rodgers and others

4.57 Mr B H Rodgers, a Harbour Commissioner, is concerned that the design of the proposed new harbour would not prevent the Canch from forming and re-forming with the necessity for further and repeated dredging of the channel, at increased cost. In his evidence (Document OBJ/P1), he refers to the current position over the availability of the HU015 disposal site and says the Commissioners are being urged by DEFRA to find other ways of dealing with the present quantities of spoil.

4.58 Mr Rodgers also objects to the design of the entrance to the proposed new harbour. He considers rock armour that would be used is a danger to navigation and refers to the prospect of back-send and to the filling of voids in the rock armour with sand. Mr M Barker, a member of the Bridlington and Flamborough Fishermen's Society and the owner of two fishing vessels, expresses similar concerns (Document OBJ/P9). Mr B H Raper, solicitor acting for the Commissioners, also supports the expert witnesses for the objectors giving evidence regarding turbulent waters that would occur at the entrance of the proposed new harbour and marina (Document OBJ/P11).

4.59 Mr P Hattersley, owner of an angling coble, Mr P Jewitt, part-owner of a commercial fishing vessel, Mr G Slack, harbour watch keeper and Mr T Petch, part-time watch keeper express concern about one or more of the following matters - danger to navigation from rock armour, turbulent waters at the harbour entrance, surge within the harbour, extra dredging requirements, effects on the movement of the Canch and related issues arising from the effects of the proposed scheme on coastal processes (Documents OBJ/P14, OBJ/P15 (written representation), OBJ/P17 and OBJ/P18, respectively).

Responses to the evidence of Messers Rodgers, Barker, Raper, Hattersley, Jewitt, Slack and Petch by the Council

4.60 The matter of the HU015 disposal site, referred to by Mr Rodgers, as currently understood, is discussed in Chapter 2, Paragraph 2.47. The Council indicate that no decision has been made about the final position with respect to this disposal site, and there is no evidence to suggest significant changes would occur in the costs involved in dumping dredged material (Document APP/RP52).

4.61 The Council agree that the proposed new breakwater would not prevent the Canch from re-forming. The Canch acts as a valuable means of sediment transfer from the North Beach to the South Beach at Bridlington, and both Mr Burt and Dr Brampton, expert witnesses, agree with that assessment, which is reported in Paragraph 4.65, below.

4.62 The Council do not agree with the view about danger at the entrance to the new harbour or the possibility that the rock armour would fill with sand. This latter point is also dealt in Paragraph 4.48, above.

4.63 The turbulence and additional danger at the mouth of the new harbour feared by the objectors would not arise as rock armour has a beneficial effect on sea state compared with vertical solid walls.

This fact combined with a wider entrance than that for the existing harbour means the approach channel would be easier to navigate.

An agreed statement with regard to the Canch

4.64 An agreed statement by expert witnesses regarding the Canch, reproduced as Document OBJ/132, was signed during the inquiries by Mr T N Burt and Dr A H Brampton, on behalf of the Commissioners, and by Mr I Cooke on behalf of the Council following a joint discussion of the evidence that had been produced by the parties. The physiography of the Canch is described in Chapter 2, Paragraph 2.15.

4.65 The substance of the statement indicates that if the proposed scheme is built the mechanisms which presently supply sand to the existing Canch would continue to operate, albeit that the wave-induced currents would be weakened both by the deeper water and the roughness of the new breakwater extension. There would be an increase in tidal currents around the edge of the eastern breakwater. However, on the basis of data at present available, the net effect of changes in wave and tidal currents are difficult to predict. This means that no certainty can be attributed as to how high a new Canch may form, but these three experts would expect it to be lower than the existing Canch. They agree that the formation of a new Canch off the end of the eastern breakwater cannot be discounted. Whether it would form a substantial feature cannot be ascertained at this stage in the investigations. They would expect the orientation of any new Canch to be roughly along the 2.0 m depth contour.

Mr M Terrell

4.66 Mr M Terrell is a marine consultant and professional diver, and a former naval officer. His statement of case and proof of evidence are reproduced in Document OBJ/P37 and a summary of that proof in Document OBJ/SP38, dated 7 September 2001. In March 2002 he issued a review of the evidence then available covering elements of wave generation, travel and decay as well as other environmental aspects including marine sedimentary transport and geophysical and hydrographic surveying, and a detailed critique of the ES. He asks for this review and critique to be considered in conjunction with his statement of case and proof of evidence. Towards the end of the inquiries, in July 2002, he also submitted an essay on computer models, including SWAN, an acronym for a software programme for simulating waves near-shore, used in the coastal process calculations in Bridlington Bay. I report in some detail the substance of his essay of March 2002 and his essay on the SWAN and other computer models (Document OBJ/223) as they update his other statements and refer to responses during the inquiries of the Council's expert witnesses.

4.67 Regarding wave climate, several published works are quoted, especially the Beach Management Manual (Document BPHC 28). The witness describes coastlines as sites of active erosion by waves, the most obvious targets being cliffs against which the waves break or the shores on which they fall. He discusses plunging waves and spilling waves, wave-generated currents, the wave refraction process, and Snell's Law (Document APP/58). He describes sediments as comprising of rock materials that have different specific gravities, and movement of the particles by waves according to particle size and the settling velocity. He relates his thesis on wave behaviour to the elements of marine sedimentary transport, which is reported in Paragraphs 4.72 to 4.80, below. His hypothesis is derived from observations of Bridlington Bay, the bathymetry revealed by Admiralty charts and personal underwater observations. He says he awaits confirmation or refutation of his hypothesis by an extensive quantitative survey.

4.68 The objector discusses the elements of marine sedimentary transport and reiterates that sand, stones and cobbles are moved by water according to their velocity, a process that is largely determined by their density and size. Another mechanism is also significant, which is the shifting of material by current across the bottom of the sea. He maintains that the larger stones are subjected to the full force of the current whereas the fine sands may be almost completely unaffected unless turbulence, such as under a collapsing wave, disturbs the regime.

4.69 The objector then develops his concepts of the movement of cobbles and sand under the influence of waves and in-shore currents, and indicates mechanisms that lead to accumulation of materials on beaches with various slopes. He refers to Document BPHC 28 with respect to the formation of cusps of coarser particles. He chooses a formula put forward by Kamphuis in 1992, quoted in Document BPHC 28, and applies approximate figures to it. He stresses the point that it is so difficult out on the beach to measure the quantities involved with precision and that the expression in the formula can only be about 50 per cent accurate.

4.70 The interaction of these mechanisms leads him to the conclusion that stones are often more mobile than sand; that the sediment sizes tend to be well sorted, with the finer sand lower down the beach; that different sizes of sediment may be moved in different directions; and that the tide has little effect other than forming ripples in the sand until waves lift the sediment into the current for it to be re-deposited mostly on-shore and off-shore but drifted in the predominant tidal direction. Wind has a considerable effect in modifying the off-shore and on-shore transport of sand by waves. All these mechanisms can be observed in Bridlington Bay.

4.71 Mr Terrell discusses the elements of geophysical and hydrographic surveying and various electronic measurements and what he perceives as their limitations, especially the problem of calibration and re-calibration, and refers specifically to the use of echo sounders. He argues that ground correlation, also called ground truthing, is an essential part of any geophysical survey if the subsequent interpretation is to be unequivocal, and says that such an approach was not adopted in the EIA.

4.72 A substantial part of the objector's essay is then devoted to the application of the principles involved in marine sedimentary transport to the situation in Bridlington Bay as reported in summary below. The bay has been formed very recently, in terms of geological time, by erosion of the coast since the last Ice Age. The source of eroded sand has to be sought in the eroded deposits, as there is no significant external supply. There is, according to the models, likely to be some exchange of sand with Filey Bay, but it is likely to be insignificant. The other point made is that boulder clay, as it erodes, is not replaced. This explains why any lowering of the sea bed level or the level of the clay in any part of Bridlington Bay has to be sought in wave and tide action in the immediate past.

4.73 The objector believes that Flamborough Head creates a tidal gyre, which rotates clockwise at both states of the tidal flow. This is enhanced by the presence of the Smithic Bank, which divided the tidal flows and whose origin must be sought in the development of Bridlington Bay at the end of the last glacial period. At that time the north Humber plain extended from a point to the east of Flamborough Head southward to the Humber Estuary, and the sea level was considerably lower than today.

4.74 Mr Terrell devotes several paragraphs in his essay to the historical development of Bridlington Bay. He describes, in his hypothesis, how the channel, or trough, was cut between Flamborough Head and the Smithic Bank. He believes it was unlikely to have been cut by the tidal stream, as its depth and width are unrelated to the strength of this stream as it speeds up towards the northern end. He says this is an interactive process between the refracted waves and is self-reinforcing; and adds that no other mechanism could account for the presence of this comparatively deep feature cut into the clay to twice the depth of that part of the bay floor that is sheltered by the growing Smithic Bank. There exists a continuing process of shifting material, which is seen in the steeper north westerly flank of Smithic Bank as compared to the south easterly flank. He says that measurement is needed to forecast the life of the Smithic Bank as the feature is squeezed on both flanks.

4.75 Another important feature, which he suggests has been ignored in the ES, concerns the toe of the beach slope in the vicinity of Bridlington Harbour. He says this has retreated over a distance of about 200 m between 1892 and 1973, according to the chart surveys for that period. The retreat, he estimates, was at a rate of about 1.0 m per annum, and appears to have been maintained to the present, as shown by a recent survey carried out in the year 2000. He provides data from charts and a figure demonstrating isometric bottom and sub-bottom contours.

4.76 He then argues that for this condition to arise it must be possible for waves of sufficient energy to arrive at the foreshore slope, entrain the sand and persist for long enough to produce the observed effect. He suggests that the average characteristics of a breaking storm wave at mid-tide would be expected to be 6.5 m in height and 7.6 seconds period, with the greatest possibility of it coming from the south east. From any other direction the wave would be reduced by the Smithic Bank or obstructed by land. He also discusses the refraction of waves by the 30 m contour if coming from the north and north east, and refers to a figure in his document demonstrating sedimentary circulation in Bridlington Bay. He claims that the bay is a self-contained sedimentary unit, which should have its own subsidiary classification as a coastal cell according to the definition on Page 90 of Document BPHC 28.

4.77 The objector then states Bridlington Bay is particularly notable with respect to its sedimentary transport regime, and proceeds to summarise its principal features. He concentrates on the hypothesis that while the Filey Bay - Bridlington Bay exchange may be a subsidiary mechanism the main flow northward in Bridlington Bay occurs under the influence of the ebb tide and southerly to south easterly waves, driving the sand just to the north of Smithic Bank, maybe into Filey Bay and then across to where it can be picked up and returned to Smithic Bank by large northerly waves and the flood tide. His interpretation of the route, derived from an analysis of the data, remains an hypothesis until such time as quantitative observations of the transport system over at least a twelve month weather cycle is completed. Meanwhile other competing hypotheses can be applied, and he summarises various sediment transport and associated processes that may be occurring in Bridlington Bay.

4.78 Mr Terrell then returns to the question of wave refraction and complains that the vector plots shown in Document ERYC 2 were produced by a coarse, uncoordinated grid system of refraction calculation, which completely confuses the actual contours. The Council's consultants had used the SWAN computer modelling system, and his views on this technique are discussed further in Paragraphs 4.81 to 4.83, below. Mr Terrell then describes wave refraction that he has observed, referring to waves coming from the north and from the east and south quadrant, and their effects as engines driving the sedimentary circulation. He also describes various erosion patterns along the coastline in the Bridlington area. He considers that the wave model used in the EIA is inadequate and has led to preconceptions through lack of observations made on site. He refers to several examples of matters that should in his opinion have been observed on site.

4.79 The objector emphasises the seriousness of erosion of the Bridlington Bay sediments, and says this matter is an obvious first consideration for a major structure such as the proposed marina scheme. He maintains that the quantities of sediments involved do not appear to have been given any attention by the Council or their engineers. He then gives a figure of 8,500,000 m^3 with respect to an area of 58,124,000 m^2, and considers it is made up of sand equally distributed between the Smithic Bank and the shore slope around the coastline. He indicates the importance of uninterrupted flow of sediment round the bay for sustaining the major marine features of the area as well as the structures on-shore protected by them.

4.80 The next section of his review is entitled "checking the evidence", and he complains about the number of errors in the ES and questions the reliability of some of the data. He argues that the paucity of directly observed evidence in the documentation concerning the environment of Bridlington Bay is striking despite the quantity of papers produced by the Council and their consultants. The existing environment, particularly with regard to erosion and sand transport, is ignored in favour of predictions given by defective models presumably of what 'ought to exist'. He develops his criticism of the use of modelling in some detail, and it is summarised below.

The SWAN model

4.81 SWAN is an acronym for "Simulating Waves Nearshore". It is accompanied by a user manual, reproduced in Document APP/256, in which Delft University of Technology, who designed the software, describe it as a numerical wave model to obtain realistic estimates of wave parameters in coastal areas.

4.82 Towards the end of the inquiries Mr Terrell submitted an additional paper in the form of an essay, entitled "Interpretation of Computer Model Results", and a letter, dealing principally with the SWAN model (Documents OBJ/223 and OBJ/224). In a summary of the essay, he says that computer models are useful tools in investigating coastal processes. However, he claims there is always a danger that if the engineer involved in the studies is not alert to the possibility of error in entering the data or if the complexity of the model is not understood then inevitably 'garbage in' will result in 'garbage out'. He says this is what appears to have happened in the course of compiling proposals for the scheme. He then reviews the application of the SWAN model to wave refraction in Bridlington Bay, and arrives at two conclusions.

4.83 First, he concludes that not only has the model been wrongly applied with respect to determining the hazards posed by the scheme but that these errors may have compromised the use of the MIKE21-EMS and the UNIBEST-LT models in the detailed views of wave climate around Bridlington Harbour and sediment transport along the beaches of the bay, respectively. Secondly, he concludes that as this issue is of prime importance to the continued physical existence of Bridlington in the near term, there should be a detailed independent professional scientific investigation of the use made of all three models by the consulting engineers. If that investigation found the consultants' interpretations to be incorrect, as his essay indicates is the case, and if the works they advocate are implemented by the Council, then catastrophic physical and financial consequences for the town and harbour of Bridlington would follow.

Responses to Mr Terrell's evidence by the Council

4.84 Expert witnesses provided by the Council's marine consultants are critical generally of Mr Terrell's essay on the following grounds, which are reported in more detail in Document APP/215.

(1) His references are not correctly quoted, which makes it difficult to determine their relevance to the evidence submitted in the essay.

(2) They agree with some of the statements made by the objector, but others are inaccurate generalisations or misleading. Several references are used in the wrong context and the objector does not show a basic understanding of the published works referred to.

(3) The objector's *curriculum vitae* demonstrates that as a marine consultant he has no direct experience of coastal processes nor indeed has he apparently been commissioned to do such studies.

(4) He has demonstrated that he does not understand the fundamental principles of wave mechanics or the interactive nature of the wave refraction and diffraction processes or the basis upon which numerical models are operated.

(5) The essay is replete with sophistry, which has no factual basis or support; and the consultants are not aware of any physical evidence either by way of repeatable measurements or of studies based on calibrated models that could be used to support the objector's assertions. Such diving inspections as the objector has made cannot be verified.

4.85 Mr Cooke, the Council's expert witness on the marine environment, says Mr Terrell is incorrect regarding several specific matters reported above relating to sediment transport. He describes what he considers to be the correct interpretation. He also criticises the objector for introducing irrelevant and incorrect references to authoritative works, and for promoting flawed interpretations of sediment mechanisms. While he quotes extensively from Komar and the Beach Management Manual (Document BPHC 28) he says Mr Terrell lacks appreciation of the fundamental mechanics, which renders his arguments open to criticism.

4.86 Mr Cooke states, he does not believe that wind driven sediment movement is a major contributory factor in the movement of sediment in Bridlington Bay, but does not discount its importance regarding the sand dunes to the south of the town.

4.87 The geophysical methods adopted by Shoreline Surveys (Document ERYC 71) were calibrated and cross-referenced. This method ensured that the on-site speed of acoustic propagation through the entire water column was accounted for within the echo sounder and remained constant throughout the duration of the survey. A qualified and experienced geophysicist executed and interpreted the sub-bottom investigations. No misleading reflections were encountered through the use of the echo sounder.

4.88 Regarding the objector's criticism of the absence of ground truthing, the sea bed in Bridlington Bay is not remarkable and this method was not required for the survey. Moreover, the descriptions of the bed material given in the survey report are in complete agreement with the sediment descriptions given in the appendices to the proof of evidence of Mr T N Burt (Document OBJ/P20), an expert witness who represents the Commissioners, and there is no need for further verification of the results.

4.89 The supply of material from Filey Bay, while small in the context of the Holderness Coast as a whole, is nevertheless significant in the context of Bridlington Bay where the net drift in a southerly direction is between 83,000 m^3 and 134,000 m^3 per annum. A drift divide does exist in the locality of Barmston, as claimed by Mr Terrell, but the precise location of such a divide is not a matter of fact, as it will range along the coastline from year to year depending on the prevailing wave climate.

4.90 Regarding on-shore and off-shore movement of sediment being observed by Mr Terrell, Mr Cooke asks how this observation was made. Visual observations are of no value since they are confined to a small frame of reference, which Mr Terrell has been unable to fix in terms of Bridlington Bay as a whole.

4.91 Mr Terrell is incorrect in his statement that the tidal gyre in the bay rotates clockwise at both states of the tide. Measurements made by Yorkshire Water show that the clockwise gyre exists around the times of high tide only. It does not manifest itself at low ride. Mr Cooke explains further that the gyre exists as a result of the presence of Flamborough Head; because of the trapping efficiency of the gyre, sediment collects towards its centre thereby forming the Smithic Bank. The primary process is the gyre itself. Any enhancement of the tidal flows as a result of the Smithic Bank is secondary to the gyre itself. The creation of Bridlington Bay merely provided the space for the sand to be deposited.

4.92 Regarding the historical development of Bridlington Bay in recent geological time, Mr Cooke says the objector's arguments are fallacious and many of his statements are suppositions that are presented in his review as fact. He is dismissive of the objector's estimates with respect to the development of the coastline over the last 12,000 years, the relevance of some of his points, and the inaccuracy arising from his understanding of the way in which the channel between Flamborough Head and the North Smithic Bank-Smithic Bank complex has formed under the influence of wave action. The correct position is that waves do not cut channels but currents do.

4.93 The slope of the beach is said by the objector to have retreated 200 m between 1892 and 1973, a migration of almost 2.5 m a year and not 1.0 m as suggested by Mr Terrell in his review. It is not possible to verify the rate of retreat, as we are not made party to the baseline information. He will not agree with the objector that 0.3 m of sand is significant given that that amount of material can be lost in a single storm. There is evidence for the Holderness Coast that the underlying clay may be exposed in some places, but evidence of clay exposure in Bridlington Bay is not supported by an examination of the bathymetry.

4.94 Regarding the impact of waves on the beaches of Bridlington Bay, Mr Cooke says that Mr Terrell's appraisal of the situation runs counter to the analyses of the Meteorological Office records, which would indicate that for his notional wave height of 6.5 m to be reached a wind in excess of approximately 43 knots would need to blow continuously for a period of 15 hours or more. The highest daily mean wind speed at the Bridlington Meteorological Station was recorded in December 1997, at 34 knots, much lower than that required to generate a 6.5 m wave. Moreover, the objector has not substantiated any of his claims that the majority of winds blow from the south east. Records

from the meteorological station show that winds from that direction blow for 18.6 % of the time, compared with winds from the north east which blow for 16.4 % of the time, while the majority of the wind occurs in the south west quadrant, and they blow for 36 % of the time. A wind rose demonstrates the position in Document APP/167. Mr Cooke agrees with the objector that Smithic Bank will act to diminish the effect of the waves from the east and north east.

4.95 Regarding the objector's notion that Bridlington Bay should be a self-contained sedimentary unit, Mr Cooke says there is no evidence to support this. The definition Mr Terrell refers to in Page 90 of Document BPHC 28 does not fit with the patterns of sediment transport that have been shown to take place, and which have been acknowledged in part by an expert witness representing the Commissioners, namely Dr A H Brampton of HR Wallingford.

4.96 Regarding the objector's criticisms of the ES because it is erroneous, Mr Cooke indicates that errors to which he refers have been the subject of an addendum to the Works Order and are dimensional in nature. They do not in any way affect the results of the coastal process studies since these were developed using models having the correct dimensional data supplied.

4.97 With respect to the objector's extended description of sedimentation in Bridlington Bay, Mr Cooke indicates that the Council have provided evidence to the inquiries on this matter, which deals in detail with the effects of the structures of the proposed scheme on the transport of sediment. English Nature and their specialist consultant, Professor Pethick, have reviewed that information, and they conclude that the scheme would have no significant effect on the sedimentation process in Bridlington Bay. Mr Terrell has produced no evidence to the inquiries that supports his supposition that the sedimentary system in the bay is a nearly closed system. Furthermore, as indicated in Paragraph 4.91, above, the gyre only exists for a short period at the time of peak spring or neap tides; and the evidence of wind speeds and directions, reported in Paragraph 4.94, above, clearly shows that waves from the north east quadrant are more numerous than from the south east quadrant by a factor of 2:1. This evidence taken together with the analyses of wave refraction and of sediment movement through defined beach profiles carried out by the consultants clearly demonstrate that there is a net drift of sediment towards the south. The visual evidence on the beach is incontrovertible, as it shows the movement of chalk boulders by waves southward from chalk cliffs off Flamborough Head down to the beach immediately adjacent to the root of the North Pier at Bridlington.

The SWAN model

4.98 The response of Mr Cooke to the objector's comments regarding the use of the SWAN wave modelling system is dealt with in the following paragraphs and in Document APP/263. He says that SWAN is a robust and reliable model used by a considerable number of professional and academic institutions around the world, including, in the UK, some 40 organisations registered as holding at least one copy of the software. It was used together with other industry standard programmes, namely MIKE 21-EMS wave model and UNIBEST-LT software package for sediment movement. These are preferred to modelling tanks as they produce quicker and more accurate results. SWAN is described in Document APP/256.

4.99 The data are generated in a standard manner and plotted using industry standard software. The information used in the studies for the proposed scheme has been available alike to objectors and the statutory bodies consulted. It is worth noting that the Commissioners, who are also objectors to the scheme, employ experts from HR Wallingford, who are registered as SWAN users and therefore familiar with the output of the model. Mr Cooke and his consultancy company actively participate in exchanges of information through user groups and fully understand the limitations of the software, a matter recognised in their evidence to the inquiries. Any doubt attaching to the results as indicated in the objector's essay on the subject arises from Mr Terrell's inability to understand, or to accept, the output of the model and the differences between the spectral and trajectory methods.

4.100 Mr Cooke says that the objector, in his summary, acknowledges that computer models are useful tools. This is contrary to his previous standpoint at the inquiries, in which he relies on visual observations. He further states that the results of the SWAN model have been wrongly applied and

that Mr Cooke and his colleagues have thereby compromised the interpretation of the other models involved, namely the MIKE 21-EMS and UNIBEST-LT. Mr Cooke responds by indicating the use of the output in the UNIBEST-LT model is an entirely independent exercise. He maintains that Mr Terrell's review of the SWAN model has further demonstrated a lack of understanding of the fundamental principles involved with respect to the physics of wave propagation. He concludes that the objector has not produced any evidence which detracts from any of the Council's earlier evidence or which demonstrates any inconsistencies between the use and interpretation of models.

Other objectors

4.101 Other objectors express concern about the possibility that the sediment regime in Bridlington Bay might be affected adversely by the construction of the proposed marina scheme. Written representations from 21 people express concern about the effects of the scheme on the coastline and wildlife.

Responses to other objectors by the Council

4.102 In their responses the Council emphasise that they employed world-renowned engineers Posford Duvivier who have extensive knowledge of working along the east coast and they have carried out an EIA that includes coastal modelling work. Their conclusions are that the impacts on the coastline would be localised. Consultations have taken place with English Nature, who conclude that the scheme would not have an adverse impact on the cSAC at Flamborough Head. The Council have agreed a package of mitigation and monitoring measures to deal with limited impacts.

Findings

4.103 Mr Cooke, the Council's expert witness, argues that the case made in the ES is based on sound engineering principles, and he elaborates in the evidence he produced at the inquiries, and by referring to that of consulting engineers and other specialists in marine environmental issues. Responses to the objectors' concerns, reported above, are expanded in some respects in additional papers produced at the inquiries.

4.104 Regarding the evidence of Dr Brampton and Mr Burt, there is a difference of opinion between these two experts, on the one hand, and Mr Cooke, on the other, mainly concerning the adequacy of the data obtained in the EIA with respect to wave action and sediment movement. However, it became clear during the inquiries that additional studies carried out by the Council's consultants, after completion of the EIA, have rectified some of the deficiencies in the database brought to our attention by objectors. I refer particularly to the additional modelling of tidal currents and wave action. I would regard the overall input of research effort in these respects to be commensurate with the requirements of the EIA procedure in this case. It does take account of the complexity of the coastal regime and the vulnerability of the coastal zone, particularly the Smithic Bank and the beaches at Bridlington, should a major disturbance be caused to the coastal processes. I am impressed by the extent and depth of the consultations that have taken place between the Council and English Nature and their expert consultant, Professor Pethick.

4.105 English Nature have a clear duty under various legislative measures to ensure the protection of the cSAC and other features of designated natural environment of scientific interest in the Flamborough Head area. It is agreed by the parties generally that if damage were caused to the Smithic Bank system through disturbance of the sedimentary system, such as through the impact of the proposed marina scheme on wave behaviour and tidal currents, then the integrity of the scientific interest in the areas around Flamborough Head would be in jeopardy. Two expert witnesses called by the Commissioners, namely Dr Brampton and Mr Burt, have asked the right questions in this respect, and they have been answered by the Council's experts. I consider that the responses of the Council's experts in these fields, and the opinions on these matters given in detail by English Nature, including their evidence to the inquiries (Document REP/4), taken together, should be regarded as adequately convincing to dispel the concerns about the potential effects of the proposed works on coastal processes in the Bridlington Bay area.

4.106 I am also mindful that the Council are prepared to carry out further studies during the detailed design stage if the scheme goes ahead. There are points of detail that require to be clarified before construction work could be allowed. Their clarification should involve continuing consultations with English Nature and other sources of expert advice and opinions.

4.107 Regarding the evidence of other witnesses who appear on behalf of the Commissioners, the Council's responses convince me that the problems of wave behaviour and sediment deposition in and around the proposed rock armour structures, and within the voids among the rocks, would not be a matter of great concern. The engineering evidence, produced by consultants with extensive experience of such structures, ought to dispel the objectors' concerns. The concerns about the Canch have also been settled in so far as it is possible to do so at the present time. The Council's responses to the claims that the rock armour structures present a danger are not entirely clear. Their Counsel submits that there is no evidence of any danger to users as a result of the use of these structures. I assume she refers to boats entering or leaving the new harbour. It is clear from the ES and remarks made by some of the witnesses that having rock armour on the beach is a different matter as it is dangerous to children and possibly other users of the seashore.

4.108 Although there have been discrepancies in the data provided about the total amount of material dumped over the years at the FEPA 1985 licensed HU105 disposal site, the variations in tonnage figures given are not in themselves of great significance for the future. There is a limit of 20,000 tonnes per annum imposed by the licence for the site and we are led to believe that there is no reason to doubt the need to vary this limit. We are also given information indicating that should a request be made to increase the limit then it does not follow that it would be denied. There is also the suggestion that other places could be used for dumping if the capacity of HU105 disposal site is exceeded. In any case, it is accepted that the cSAC Management Group would monitor risks arising from this disposal issue. I am not unduly concerned about this matter in the light of all the evidence put before the inquires.

4. 109 Regarding Mr Terrell's essay contained in his review of evidence, dated March 2002, and his other statements dealing with the coastal regime, I do not consider that he has made a material contribution to the work reported in the ES, or to the evidence of the Council's expert witnesses based on studies carried out after the ES had been completed. His appraisal of wave behaviour, based mainly on his personal observations, theoretical considerations and hypotheses does not seem to me to undermine the conclusions of the EIA generally or, specifically, those of the marine consultants in this respect. Wave climate as it directly affects movement of sediment, a primary aspect of Mr Terrell's evidence, is discussed in more detail below.

4.110 It is apparent that there are fundamental differences in the approach of Mr Terrell to these coastal regime matters from that adopted by the Council's marine consultants. Mr Terrell, in arriving at his conclusions and formulating his objections, relies on (1) personal observation of features and processes in the marine environment, (2) extensive consideration of published works generally and those relating to Bridlington Bay, (3) hypotheses founded in his understanding of the published works combined with conclusions based on his personal observations in the field, and (4) deep suspicion of the use of information technology and other methods for estimating parameters and for extrapolating data from one site, or one set of circumstances, to another, which also includes systems modelling.

4.111 Dealing first with (1), his personal observations, I am in no doubt that over the years he has observed a wide range of situations relating to waves and sediment in the bay. He does not bring these into focus by the use of scientific methods of deduction in the process of arriving at conclusions. It is difficult to identify from his evidence situations and locations referred to generally that could be examined factually and his observations about them tested by other scientists. There is a shortage of reliable data to support his observations. He freely admits that he cannot provide enough data for reliable conclusions to be made on that basis. Consequently, he argues that the hypotheses he puts forward cannot be disproved. I would add that neither can they be proved.

4.112 Regarding (2), his review of the literature, the Council consider that he misinterprets some of the work he quotes. I share their doubts about his interpretation of some aspects. I am also concerned about the extent of the mistakes he has made in his references to the published works.

4.113 Regarding (3), his hypotheses, their validity would depend largely on two factors - first, on his interpretation of the published works that are considered authoritative in these marine matters, and secondly, on the relationships that exist between authoritative works and the position on the ground in this particular case. He attempts to relate his interpretation of published wisdom to a database that is grossly inadequate, on a scientific basis, to lead to any conclusion. I do not accept that his hypotheses should be relied on as a contribution towards interpreting the marine phenomena in the bay.

4.114 Regarding (4), Mr Terrell is suspicious of certain accepted methods of survey and other research that involve the use of electronic equipment. Mr Cooke has responded in some detail. I accept his assurances that the investigators maintained acceptable standards of calibration of instruments and other procedures. Mr Terrell is also sceptical of the use of the SWAN model and associated software for obtaining a picture of the coastal regime. I do not accept his criticisms for several reasons, but particularly because the SWAN model is widely recognised as an advanced technique for use in situations such as those featuring in the studies carried out in Bridlington Bay. I see no reason to doubt the competence of the Council's consultants in the use of this software. I also note that the HR Wallingford, who produced two expert witnesses for the Commissioners, use this software. No objections are made by those experts or any other party at the inquires to this methodology or the use made of it in the studies of the coastal regime in Bridlington Bay conducted by the Council's consultants. I am not persuaded that Mr Terrell has reason to be concerned about the methods used or the context within which they are applied in this case.

4.115 Regarding the representations of other objectors, and the Council's responses, I consider that the evidence submitted to the inquiries demonstrates that the natural features of the coastline of Bridlington Bay generally, apart from the South Beach and in-shore area in the town itself, would not be affected to any significant degree by the proposed works. The mitigation measures proposed should the scheme be implemented are, in my view, satisfactory to ensure that the natural environment of the bay as a whole and the Flamborough Head cSAC are protected. The effect of the scheme on the natural environment in the South Beach in the town of Bridlington is a different matter and it is considered in Chapter 6 and Chapter 9 of this report.

Chapter 5: effects of the scheme on water quality and sediment quality of the coastal regime

5.1 The reports on these effects deal with the construction process, disposal of construction waste, remobilisation of contaminants during construction work, construction that could affect local water courses, the integrity of Flamborough Head cSAC in the context of water quality and sediment quality, continued disposal of maintenance material at the FEPA 1985 licensed HU015 disposal site, reception of wastes from vessels using the proposed marina, and the impounding of water within the marina basin.

Effect of construction on water quality

5.2 The construction process poses potential pollution that would affect the classified bathing waters of the North Beach and South Beach at Bridlington arising from various incidents such as spillages entering the sea. These could decrease light penetration in the water column causing a reduction in bacterial die-off rates thereby lowering the prospects for the beaches to comply with the mandatory levels in the EU Bathing Water Directive 76/160/EC and the Bathing Waters Regulations 1991 (SI 1991/1597). The ES indicates most spills, in general, would have an impact on water quality at a *negligible* level of significance after clean up or dilution and dispersion. However, they can have an impact at a *minor adverse* or *moderate adverse* level of significance in the short-term. A variety of mitigation measures are proposed, including those that comply with the requirements of the Environment Agency's pollution prevention guidelines.

Disposal of wastes and remobilisation of contaminants during construction

5.3 The construction process would not generate significant quantities of waste material because demolition works are not required. Disposal of any waste generated would be controlled to accord with statutory regulations and the duty of care to avoid causing adverse environmental impacts. However, mitigation measures would be adopted to ensure that waste is used as construction fill material, as well as to prevent the burying of debris in neighbouring beaches.

5.4 Construction would involve piling, sheet piling, reclamation and capital dredging. The greatest potential for sediment disturbance and release of contaminants would result from the capital dredging works and use of materials for land reclamation. In particular, Work No. 6, which involves land reclamation adjacent to the Chicken Run Jetty, could cause contaminant mobilisation from TBT through disturbance of the bed sediment. That disturbance would seriously pollute the waters in the existing harbour and the lower reaches of the Gypsey Race. If uncontrolled, these works would have an impact at a *moderate adverse* to *major adverse* level of significance. However, ground investigations would be carried out before dredging begins. If they reveal that the bed material is technically unsuitable for such use as construction fill it would be treated in such a way that the contaminated area is contained. The impact in that case would be at a *minor adverse* level of significance.

5.5 Capital dredging works in virgin bed sediments would be required to achieve adequate clearance for the passage of vessels in and out of the proposed new harbour. Observations made during the sub-littoral marine biological surveys revealed that these sediments are made up of coarse and fine sands (Page 72 of Document ERYC 2). The relatively large particle sizes suggest that the capital dredge in this case would occur in areas that are unlikely to serve as significant sinks for contaminated sediment, as the coarser material offers less surface for the adsorption on to them of contaminants that could affect water quality and the integrity of the ecosystem. The prospect of an environmental impact is therefore regarded as at a *negligible* level of significance. However, without sediment data quantifying the presence of contaminants in this area, and mitigation measures taken as necessary, there remains a risk that an impact would occur.

5.6 Mitigation measures to diminish or remove the threats arising from re-mobilisation of contaminants are mentioned. They relate to the FEPA 1985 consents that would be required before construction work is allowed to start.

Construction affecting local watercourses

5.7 The only local watercourse involved is the stretch of the Gypsey Race within the harbour. This stream has poor water quality and this is unlikely to deteriorate further as a result of construction works such as upgrading shore facilities for the fishing industry near the point where the river leaves the harbour to the sea. The ES states, there would be no adverse impact on local watercourses.

Integrity of the Flamborough Head cSAC with respect to water quality and sediment quality of the coastal regime

5.8 The integrity of this site with respect to sediment transport and wave action is described in Chapter 4, Paragraph 4.16. The issues arising from the effects of the works on water and sediment quality are described in the ES. It indicates that the cSAC is unlikely to be significantly affected by the scheme, for three reasons, as follows: (1) the location of the cSAC, which is situated at a considerable distance, some 700 m, from the site of the works; (2) the hydrodynamic characteristics of the bay, particularly the weak current flow; and (3) the limited extent of the sediment change between the site of the works and the off-shore environment.

5.9 The integrity of the cSAC would be impaired if the HU015 disposal site, referred to in Chapter 2, Paragraph 2.47, were to receive capital dredge spoil from the construction works. That would not be allowed to take place, and no impact would therefore arise from the dredging.

Operation effects of the continued disposal of maintenance material at the FEPA 1985 licensed HU015 disposal site

5.10 Statutory bodies have expressed a view that it may not be appropriate for the HU105 disposal site to receive large quantities of sediment, up to the limit of 20,000 tonnes per annum allowed for by the current FEPA 1985 licence, because of the proximity of the site to the cSAC at Flamborough Head. Future dredging requirements following the construction of the proposed scheme are predicted to lie in the range of 8,000 tonnes to 9,000 tonnes per annum. Given the availability of the HU015 disposal site it is considered that the impact of this activity would be at a *negligible* level of significance. The matter of the future of the licence is under review by DEFRA and English Nature.

Reception of waste from vessels using the proposed marina

5.11 The attraction of considerably more vessels to Bridlington following the completion of the proposed scheme could affect water quality if suitable waste disposal facilities were not made available for the reception of oil, refuse and sewage. Statutory requirements and guidelines exist to control waste from vessels and to minimise environmental risks at marinas. Harbour authorities are required by law to provide the facilities that are necessary. With the statutory facilities in place it is considered that the impact of wastes from harbour and marina activities in Bridlington would be at a *negligible* level of significance.

5.12 Avoidance of accidental spills cannot be assured and there is a potential for an impact at *minor adverse* to *moderate adverse* level of significance. However, additional mitigation over and above the statutory requirements placed on harbour authorities are proposed, mainly those recommended by the Environment Agency in their various prevention of pollution guidelines. If those measures are adopted successfully then it is estimated that the residual impact would be at a *minor adverse* level of significance.

Impounding of water within the proposed marina

5.13 Tidal lock gates would be used to control access in and out of the water levels in the marina basin. When open, the gates would allow free flow of water between the basin and the outer harbour.

When closed for significant periods, for example during the quieter winter months, there is the prospect of stagnation and deterioration of the water quality in the complex over part of the tidal cycle. This would vary according to the frequency of use of the gates. In summer the regime would present an impact at a *negligible* level of significance, and in winter at a *moderate adverse* level of significance. Moreover, the release of stagnant deoxygenated water could have an impact at *a minor adverse* level of significance on the ecology of the outer harbour and open sea area nearby, and affect the well being of benthic and pelagic fauna and flora. Mitigation measures involving operation of a strict regime for opening and closing the lock gates are proposed so as to maximise the time when gates are left open.

The cases of the parties with respect to effects on water quality and sediment quality of the coastal regime

The Council

5.14 Ms S John, on behalf of the Council, stresses the importance of maintaining water quality at local and regional level as both the award winning North Beach and South Beach at Bridlington are designated for the bathing quality of their waters under the EU Bathing Water Directive. The water quality within the existing harbour is generally good apart from that associated with the sediments deposited close to the Chicken Run Jetty. The virgin sediments and the water column outside the harbour but in the area to be directly affected by the scheme are of high standard in terms of cleanliness generally.

5.15 Any pollutants that enter the sea in this area, such as silt, cement, fuel oil and chemicals, may cause adverse effects on the quality of the award winning beaches. Moreover, an increase in the amount of suspended solids found in the water column, caused for example by cement spillage, would result in reduced light penetration and a decrease in the die-off of bacteria. She refers to the ES regarding the importance attached to these potential impacts, which are generally regarded as at a minor adverse or moderate adverse level of significance, and of short-term duration. She considers that practising a high standard of site management could control most of the problems that might arise in the seawater and sedimentary environment. That approach would reduce the incidence of human error, the principal cause of the potential pollution events described.

5.16 There is also a risk arising from reclamation works forming part of Work No. 6 because of the existence of pollutants in the sediments around the Chicken Run Jetty. The material polluted by TBT would not be dredged. Furthermore, it would be contained within the land reclaimed in the scheme so that it is not given an opportunity to pollute the lower reaches of the Gypsey Race, and consequently, the seawater into which it flows. She states, the mitigation measures proposed in the ES are likely to be successful and to reduce these potential impacts to levels of significance that should not be a cause of concern.

5.17 Capital dredging works would be required in the virgin sediment beds to achieve adequate clearance for the passage of vessels into and out of the proposed new harbour. This area is characterised by bed sediments composed mainly of coarse to fine materials. The coarser particles are unlikely to have significant contaminants adsorbed on their surfaces. However, there is a risk of contamination although it cannot be fully assessed until further sediment quality data are obtained.

5.18 Some of the points made by Ms John are considered in more detail in Documents BPHC 29, ERYC 58, ERYC 29 and APP/AP22 and appendices to Document ERYC 2.

Objectors

The Commissioners

5.19 Mr W H Trevitt and Mr C J Wright, expert witnesses, express concern on behalf of the Commissioners about the turbidity that would be caused by depositing material to create the new breakwaters in the proposed scheme, not just near the existing harbour but for some distance in all

directions (Documents OBJ/P27 and OBJ/P3, respectively). Clean water for the fishermen's crustacean tanks is pumped from the sea using intakes on the south side of the South Pier. This would be no longer available and the ES does not state where the new source of clean water would come from. Mr Trevitt is also concerned that the ES does not identify satisfactory mitigation measures to deal with the increased turbidity.

Responses to the evidence of Mr Trevitt and Mr Wright by the Council

5.20 Mitigation proposals in the ES specify that at the detailed design stage of the scheme arrangements would be made to provide the same amount of water of the same quality as that currently available for storage to tanks (Document APP/RP53). It is envisaged this fresh seawater would be obtained by using pipelines.

5.21 Regarding mitigation measures with respect to turbidity, referred to by Mr Trevitt, this matter is considered in some detail in a paper entitled *Flamborough Head European Marine Site: Mitigation, Monitoring and Management* (Appendix I of Document APP/AP22). There is turbidity in the water in the area at the present time. The high load of suspended sediment in the water body in the vicinity of the site of the proposed works is discussed in the evidence of the Commissioners' expert witnesses, Dr Brampton and Mr Burt, and of Mr Cooke on behalf of the Council. It is considered that water quality would not be degraded to the point where it would affect the fishery interests. English Nature have confirmed that the mitigation measures proposed are adequate, and DEFRA have not expressed concern regarding the matter (Document APP/179). The Council's engineering consultant, Mr A R Parker, says that in his company's experience sea-dredged material and graded quarried rock do not cause excessive turbidity, and he quoted the case of a beach at Eastbourne immediately adjacent to an SSSI, which they had monitored. The turbidity was extremely low there and caused no damage to the SSSI.

Findings

5.22 Several sources of pollution would arise during construction and operation of the proposed scheme. They fall into categories as follows - (1) construction activities affecting sediment load through turbidity or chemical pollution in the lower reaches of the Gypsey Race and the seawater at or near the site of the works; (2) construction work releasing TBT contained in sediments near the Chicken Run Jetty; (3) capital dredging causing some release of pollutants as well as turbidity; and (4) pollution arising during the operation of different parts of the proposed scheme in the longer-term.

5.23 The ES and the evidence of the Council's expert witnesses indicate that these sources of pollution can be controlled and managed so as not to cause unacceptable harm, and that they are also mainly of short-term duration. The Council have consulted with the statutory regulators and carried out a number of surveys and analyses. Their conclusions should not cause alarm because they are based on an adequate and in some cases thorough assessment of the parameters involved. They also receive the blessing of the statutory bodies, notably the Environment Agency and English Nature. I do not therefore consider that the risks to water quality and sediment quality are of such magnitude as to cause concern, provided the mitigation measures proposed and other associated control mechanisms would be strictly applied. I find the Council's response to the objections of the Commissioners satisfactory.

Chapter 6: effects of the scheme on fauna and flora including fish and shellfish

6.1 The effects are considered with respect to coastal and off-shore habitats and species of animals and plants, including bird, fish and shellfish populations. Severe ecological impacts would occur at the site of the proposed works on the South Beach and in the in-shore marine environment nearby. However, the site is situated 700 m to the west of the southern boundary of the Flamborough Head cSAC, with the SPA and SSSI only slightly further away. The potential does exist for damage to occur in the marine environment of Bridlington Bay generally that could also affect the ecology and nature conservation features of these designated areas.

Effect of construction through direct loss of littoral foreshore and sub-littoral habitats

6.2 Approximately 13 ha of littoral foreshore made of sand and rocky shore habitats would be lost under the footprint of the structures to be built. Populations of the species associated with these habitats would disappear. The results of EIA surveys demonstrate that the area contains a limited range of habitats and species, consisting of impoverished sandy shore communities with the rocky shore habitats and species that are present occurring only on man-made rock structures.

6.3 The ES states, the effect of the footprint of the scheme in these inter-tidal and sub-tidal habitats can be seen as an impact of a *major adverse* level of significance. However, it goes on to argue that these losses should be regarded only as of minor adverse, negligible or moderate beneficial level of significance as a result of mitigation measures, which are proposed by the Council. The reasoning is reported below.

6.4 The reasoning is founded on the one hand in the premise that the littoral sandy shore is not unique or of any nature conservation interest and similar communities of animals and plants occur both to the north and to the south of the site of the works for some considerable distance. On the other hand, the rocky shore communities that occur are unique in the immediate local context; however, the ES considers that the structures to be built as part of the scheme would provide a larger amount of similar habitats to enable these communities to become re-established through a process occurring naturally over a number of years.

6.5 For the reasons given in Paragraph 6.4, above the ES therefore states, the loss of the 13 ha of littoral sandy foreshore would present an impact at a *negligible* level of significance, while the loss of rocky shore habitats is considered an impact at a *minor adverse* level of significance, and short-term in duration. Until re-colonisation of the species occurs on the increased amount of suitable rocky shore habitat that would be provided as part of the scheme, a residual short-term impact at a *minor adverse* level of significance would remain. Increased amount of suitable rocky shore habitat is likely to become available in due course and to result in an impact at a *beneficial* level of significance. No details are given about the exact location or other specifications of these new habitats that are considered likely to become available. No other mitigation measures are deemed necessary.

6.6 Approximately 7.0 ha of sub-littoral habitat would in addition be lost or directly influenced as a result of the scheme, primarily through construction of the new breakwaters. The sand communities described in Paragraph 6.2, above occupy the areas affected. In the context of the wider areas of sand nearby the loss of this habitat is regarded in the ES as an environmental impact at a *negligible* level of significance.

Construction effects through disturbance to bird populations, and operation effects on wintering waders

6.7 The site of the proposed works supports small numbers of wintering waders and the species that may be affected are purple sandpiper and turnstone. These birds are associated with rocky shore habitats and use the groynes for roosting and the seaweed and rocky shore areas for feeding. The ES states, it seems likely these birds would move northward during construction works to the wave cut

platform between Sewerby and Flamborough Head. Construction effects would therefore result in displacement of feeding and roosting waders and constitute an impact at a *minor adverse* level of significance due to the small number of birds involved. It is also proposed to provide an enhancement to the habitat of these species by the creation of a suitable rocky habitat towards the western end of the southern breakwater, which would provide an impact at a *minor beneficial* level of significance in the medium-term to longer-term. No details are given about the nature, location or extent of the habitat enhancement proposed.

6.8 The new breakwaters may provide high water roost areas for waders and, at low water, suitable habitat for feeding among the rocky substrate. These structures would facilitate, through colonisation, the development of communities of fauna and flora, including invertebrates, and provide additional feeding grounds for birds. It is considered this process would have an impact at a *moderate beneficial* level of significance but there are no data provided that could be used to predict whether this colonisation would actually take place.

Effects through remobilisation of contaminants and sediments during capital and maintenance dredging operations and through accidental spillage of contaminants

6.9 During the construction phase, especially the capital dredging operations, disturbance to sub-littoral sediment would take place affecting marine fauna and flora through the associated changes in turbidity of the water column and in suspended solids concentrations and sedimentation rates, as well as through burial of organisms. The ecological impact would depend on the background characterisation of the existing environment before it was subjected to dredging. Several complex factors are operative such as the size of particles in the sediment, sediment mobility, extent to which contaminants would be dispersed into the wider marine environment, and the adaptability of species living in the area affected.

6.10 The substrate outside the harbour at Bridlington is predominantly fine sand, and known to be dynamic in nature. Weak local currents are able to re-suspend the fine particulate matter into the water column and this phenomenon contributes to the high turbidity in the area. Consequently, the littoral and sub-littoral organisms off the shore at Bridlington are already influenced by high concentrations of suspended sediment and turbidity. This situation is reflected in the impoverished benthic communities observed in the surveys. Moreover, these background conditions give rise to species that are able to adapt to the environment, such as annelid polychaetes. It is concluded in the ES that the communities present in this area are likely to be able to adapt to any moderate and temporary increases in turbidity, suspended sediment and burial. On the basis of that conclusion it is stated the impact of capital dredging would be at a *moderate adverse* level of significance, and temporary, lasting some four months during the construction phase.

6.11 Another factor would be the creation of a dredging plume of fine material, brought into suspension by disturbance, with the capacity to travel over large distances and to remain in suspension over a number of tidal cycles. The plume would be dispersed rapidly as it moves off-shore into a more active hydrodynamic environment. The potential for the smothering of fauna and flora to occur would be very limited, and the sponges, cup corals and bryozoan living in the cSAC are unlikely to be affected.

6.12 Impacts resulting from the release of contaminants from suspended material or in the dissolved state would depend on the extent of the contamination of the dredged material. The area to be dredged is considered to be uncontaminated virgin ground so that the impact of the dredged material on organisms would be regarded as at a *negligible* level of significance. However, control of turbidity caused by suspended particulate matter would further minimise any threat to marine organisms, and mitigation measures are proposed. It is considered that, after cessation of dredging, the residual impact of this operation would be at a *negligible* level of significance.

6.13 Some degree of maintenance dredging would be required for the safe operation of the marina but the frequency of the task is not known and could only be determined at a detailed design stage.

The ES states, the potential impact on the marine habitats locally is estimated to be at a *minor adverse* level of significance and effective over a short period of time only.

6.14 Regarding contaminants, as maintenance dredging would be limited to the mouth of the new harbour in the scheme it would involve removal of material situated now in the open sea that is unlikely to have a legacy of contamination. The ES estimates that the potential impact on marine fauna and flora due to mobilisation of contaminants would be at a *negligible* level of significance.

6.15 Mitigation measures are proposed to control turbidity through minimising re-suspension of particulate matter. The operations would be subject to FEPA 1985 licensing and that in turn would trigger assessment of the contamination levels in the sediment to be dredged. If given FEPA 1985 approval the operations are expected to result in residual impact at a *negligible* level of significance.

6.16 The significance of any impact caused by accidental spillage of pollutants would depend on the substances involved and the volume discharged. Littoral and sub-littoral benthic communities are unable to exercise avoidance reactions. They could be diminished or even eradicated by pollutant spills. Such an outcome could have an impact on those organisms that use these communities as a food source.

6.17 In general, it is stated in the ES that most spillages would have an impact on water quality at a *minor adverse* or *moderate adverse* level of significance if promptly cleaned up or diluted. They are undesirable and mitigation measures are proposed based on good site management practices and the application of the Environment Agency's pollution prevention guidelines.

Operation effects through impounding water within the marina

6.18 The ES states, considering the impoverished nature of the sub-littoral ecosystem in the outer harbour and open sea immediately adjacent to it, the scheme would pose an impact on water quality in these areas, and in turn on the fauna and flora. That impact is estimated to be at a *minor adverse* level of significance in the summer, and at *moderate adverse* level of significance in the winter. Mitigation measures are proposed involving the opening of the lock gates on each high tide, and keeping them open for as long as possible, to allow exchange of water between the marina complex and the outer harbour and open sea. If implemented, those measures would reduce the residual biological impact to a *negligible* level of significance.

Construction effects of increased noise, vibration and light on the fish population and on fish mortality through dredging activity

6.19 If construction were to be carried out unregulated then fish in the area would exhibit avoidance reactions and move away until noise, vibration and light levels returned to acceptable levels. The ES considers there would therefore only be an impact at a *minor adverse* level of significance taking into account the large area of other available habitats. As the work would be temporary the residual impact would at a *minor* to *negligible* level of significance. Mitigation measures proposed involve paying respect to the appropriate procedural and health and safety regulations.

6.20 Specialist ecological surveys of the area it is proposed to dredge have been carried out and local fisheries knowledge obtained from the authorities. Mobile finfish would exhibit avoidance reactions and not stay in the vicinity of any dredging activity. The ES considers impact on these species would be at a *minor adverse* level of significance.

6.21 Sedentary species, such as razor shells, have limited ability to escape the effects of dredging but the populations of these organisms in the area are likely to be small, and part of the area is already dredged and unlikely to have a well-developed faunal population. Therefore, the ES considers the impact of dredging on these species would be at a *minor adverse* to *moderate adverse* level of significance. Mitigation measures are proposed to include surveys to determine the extent of shellfish habitat in the area. Timing of dredging would also be planned so as to avoid critical times such as when fish are spawning.

Construction effects through deterioration of water quality affecting fish

6.22 Construction activities would involve dredging, and building of breakwaters, pontoons and yacht berths, over a period of more than 24 months, resulting in opportunities for water pollution incidents to occur. Most finfish would move freely to avoid polluted water and the ES considers impact of the works on those populations would be at a *minor adverse* level of significance. For sedentary shellfish increased sediment loads may influence normal functioning of the organisms such as feeding and respiration. As the area that would be affected does not support extensive populations of shellfish the impact of the works would be at a *minor adverse* level of significance. Mitigation measures are proposed involving construction and health and safety regulations, routine monitoring of water quality and application of the Environmental Agency's pollution prevention guidelines.

Effects causing loss of razor shell populations arising from reclamation activities and fish mortality arising from detrimental water quality, and the beneficial effects of new breakwaters

6.23 The potential exists for razor shell populations to be smothered by sediment once reclamation activities are completed. Survey results reveal that the populations in the study area are small, and may even be absent from the vicinity of the scheme. The ES states, impact arising from operating the scheme on these local shellfish populations would therefore be at a *minor adverse* level of significance.

6.24 If water quality deteriorates fish would leave the area and not return until it improves. Therefore, the ES estimates that an impact at a *minor adverse* level of significance would occur. Fish populations in the marina basin would however be relatively small due to limited access from the outer harbour. Mitigation measures are proposed involving routine monitoring of water quality in the marina, daily checks at critical times and appropriate procedures for lock operation.

6.25 The ES considers that the rock armour breakwaters would act as new areas of habitat for many fish species on sites that are currently characterised by biologically poor sandy substrates. Colonisation and development of communities of animals and plants in the rocky substrates of the new structures would encourage fish feeding and support new fish populations. It is estimated that this aspect of the operation of the scheme would provide an impact at a *moderate beneficial* to *major beneficial* level of significance.

Construction effects on the biological integrity of the Flamborough Head cSAC

6.26 In the context of marine fauna and flora the ES states that the integrity of the cSAC is unlikely to be influenced directly or indirectly by the construction works affecting water quality or sediment quality. The impacts predicted to arise from the construction operations would be localised and the available hydrodynamic data indicate that the zone of influence of the works is unlikely to extend as far as the cSAC. Moreover, the near-shore habitats off Bridlington that would be affected are not similar to those within the cSAC and it is maintained that they do not contribute significantly to the functioning of that ecosystem.

6.27 Levels of turbidity would be expected to be associated with the capital dredging plume and re-suspension of contaminated material from within the existing harbour, notably the Chicken Run Jetty, due to the works. The mitigation measures referred to in Paragraph 6.12, above would limit the potential for an adverse impact on the cSAC. Therefore, the ES states, residual impacts would be at a *negligible* level of significance within the vicinity of the works and would diminish with distance from the site of the scheme due to dispersion. In those circumstances the potential for the construction activities to affect the integrity of the cSAC, located at a distance of approximately 700 m from the works, would be at a *negligible* level of significance with respect to marine fauna and flora that occupy that conservation area.

The cases of the parties with respect to effects of the scheme on fauna and flora including fish and shellfish

The Council

6.28 The Council rely on information contained in the ES and identify seven potential impacts on fauna and flora, including birds. They argue that the scheme would not have a significant effect on the cSAC at Flamborough Head. They also identify three potential impacts on fish and shellfish. Ms Sian John, on the Council's behalf, describes the nature and significance of the potential impacts and the mitigation measures that are proposed. The substance of the Council's case is summarised below.

6.29 The impacts on littoral and sub-littoral habitats and species are identified in the following seven Sub-paragraphs.

(1) Direct loss of 13 ha of littoral foreshore immediately to the south of the existing harbour, which is that part of the South Beach nearest to the town, would occur as this seaside disappears under the platform of land created to the south of the harbour as a base for the topside development, and the marina basin and outer harbour. The Council consider that the loss of beach could be described as a major adverse ecological impact. However, they argue that such a situation would not in fact arise because the littoral foreshore to be lost is of limited biological importance in terms of its habitats and species. They refer to it as an area predominantly consisting of sandy shore community with rocky shore habitats and species limited to the man-made rock structures. They also claim that the sandy shore community is not unique, or of any nature conservation interest, with similar communities occurring both to the north and to the south of the site of the works. Nevertheless, the Council do recognise that the rocky shore communities in the area are unique in the immediate local context but consider that the proposed development, if it goes ahead, would in due time provide a larger amount of similar habitats for the re-establishment naturally of these communities over a number of years. The Council reiterate the position as given in the ES, that the loss of 13 ha of littoral foreshore on this stretch of coastline presents a negligible impact, while loss of rocky shore habitats would be a minor adverse impact, which would be of short-term duration, and in due time would turn into a beneficial impact following colonisation of the new structures by fauna and flora. No additional mitigation measures are considered necessary.

(2) Approximately 7.0 ha of sub-littoral habitat would be lost or directly influenced mainly during the construction of the breakwaters in the scheme. The Council consider that the loss could also be described as a major adverse impact. However, they use virtually the same argument as in the case of the 13 ha reported in Sub-paragraph (1), above to claim that such a situation would not in fact arise. The Council's reasoning is that the habitat that would be lost is biologically impoverished, and not unique, or of any nature conservation interest, and that its loss would represent a negligible impact on the natural environment.

(3) During the construction phase there would be disturbance to sub-littoral sediment, especially from capital dredging. The Council accept that there would be changes in turbidity, suspended solids concentrations and sedimentation rates, and that organisms would be buried. There is also a risk of contaminants being released. The resulting ecological impacts would depend on the normal, or background, characterisation of the existing environment. The organisms affected could adapt to any moderate temporary increases in turbidity, suspended sediment or burial, and would rapidly re-colonise. They support the view in the ES, that the significance of the adverse impact on the local area would be moderate and temporary in nature, and that no mitigation measures are required. The local area referred to, though not delineated in this context, is understood to be the area that is likely to be directly involved in the disturbance during construction. It is considered that there would be no significant impact outside this area.

(4) The Council then move to consider the impact of the construction phase on the wider environment. They discuss the problem again in the context of the ES by focussing on the transport of re-suspended sediments and contaminants bound to the surfaces of particles in a sediment plume into the wider environment by hydrodynamic processes. The magnitude of the change in turbidity would be limited and not expected to significantly exceed background levels. The sediment plume would disperse rapidly as it moves off-shore, and organisms belonging to mobile species would avoid it while sedentary species in the area are largely adapted to turbid conditions. The Council agree with the ES that the significance of the residual impact of the plume generated by the reclamation and deepening works would be negligible. Mitigation measures would, however, be applied by careful management of activities by the contractor so as to minimise the occurrence of particle re-suspension in the water column.

(5) The Council consider that the ES is correct in stating that impacts on organisms from release of contaminated material would be negligible because the area to be dredged is not contaminated. The contractor would practise mitigation by exercising good site management.

(6) The Council also consider that accidental spillages during construction are a potential threat to fauna and flora. Benthic communities are unable to exhibit avoidance reactions and are thereby susceptible to spills. Spills would have a minor to moderate impact on water quality and mitigation in the form of good site management is proposed.

(7) The site of the works supports populations of bird species associated with rocky shore habitats, notably purple sandpiper and turnstone. They would be likely to move away during the construction phase. There are mitigation proposals to attempt to provide them with a re-constructed habitat as a part of the scheme so that they would, hopefully, return to the area. The Council consider the impact on these bird populations would be of minor adverse significance due to the small numbers recorded from the area. They consider also that the mitigation proposals would not reduce the short-term disturbance but provide a minor benefit in the medium-term to long-term.

6.30 The integrity of the Flamborough Head cSAC is considered thoroughly by the Council. They refer in particular to the use of information obtained from the sub-littoral and littoral surveys and coastal process investigations, reported in the ES and its appendices. Consultations were carried out with English Nature and they refer to the paper entitled *Flamborough Head European Marine Site, English Nature's advice given under Regulation 33(2) of the Habitats Regulation 1994*, which is reproduced in Document ERYC 58.

6.31 The Council support the conclusions in the ES regarding effects on the cSAC, which are summarised in Sub-paragraphs (1) to (4), below.

(1) The hydrodynamic implications of the proposed scheme on the cSAC would be negligible because of its location outside the zone of influence of the scheme. The impact on the sediment regime of Bridlington Bay as a whole would be slight. The fauna and flora of the European site are unlikely therefore to be affected, and no mitigation measures are deemed necessary.

(2) They also conclude that there are no significant implications to the cSAC arising from water quality and sediment quality. This is due to the distance of the European site form Bridlington, the weak current flow in the area and the limited sediment exchange that occurs between the harbour and the off-shore environment.

(3) They accept that the dumping of maintenance-dredged material at the FEPA 1985 licensed HU015 disposal site is of more direct significance. There have been extensive consultations with the regulatory and other authorities on his matter, particularly with CEFAS. Those authorities have expressed no concerns about a threat arising from this practice. However, as the European site is a sensitive area the position was reviewed by CEFAS in 2000. They conclude that the material deposited in the HU015 disposal site is

likely to move off-shore and southward in the long-term, and away from the cSAC. CEFAS have renewed the licence to allow a maximum of 20,000 tonnes per annum with a condition that changes in the method of disposal are not suggested and that information obtained by monitoring the cSAC does not suggest that there is an increased risk of impact. The annual dredging expected to be associated with the operation of the scheme is around 17,000 tonnes per annum and would cause no impact on the cSAC. Moreover, material dredged during the construction of the works would not be disposed of at sea but used in the construction of the platform of reclaimed land for the topside development. The Council consider no mitigation is necessary with respect to sediment quality and water quality.

(4) The Council are confident, on the basis of the research they commissioned and their consultations with statutory regulators, that the works would not directly affect the cSAC or a habitat that contributes significantly to its functioning. The habitats that occupy the site of the scheme would be severely affected, with partial or complete loss of populations of fauna and flora, but they consider this matter does not cause concern as far as the integrity of the cSAC is concerned. They have adopted this position on the grounds that the habitats at, or close to, the site of the works, mainly occurring in inter-tidal and sub-tidal areas immediately to the south of the existing harbour, are expendable as they are not similar to those in the cSAC and do not contribute to the ecological system of the European site.

6.32 Regarding the effects on fish and shellfish, the Council identify three sources of impact, which are reported in Sub-paragraphs (1) to (3), below.

(1) Disturbance to fish populations would be caused by noise, vibration and light pollution arising from dredging activities, construction of breakwaters and quay structures, and reclamation processes. They refer to details reported in the ES and conclude that the residual impact would be of minor or negligible significance, as the contractors would carry out the work in accordance with the statutory regulations.

(2) Dredging would affect the shellfish populations, but most finfish would move out of the way. Sedentary species like whelk and razor shells would be sucked into the dredging machinery and destroyed. There is some indication that the numbers involved would be small. Mitigation measures would include the carrying out of a pre-dredging survey to provide data that would enable large shellfish populations to be avoided. The Council consider that the residual impact would be of minor adverse significance.

(3) Deterioration in environmental quality caused by increased sediment load, and fuel spills from plants or pollution from other sources may affect fish populations. Shellfish populations would suffer, especially if turbidity levels increased, as that would affect normal biological functions such as feeding and respiratory responses. Severe deterioration in water quality would lead to a major adverse impact. Mitigation is proposed by the Council stipulating all works are carried out in accordance with the guidelines in the statutory regulations that apply, and that water quality is monitored regularly.

Objectors

The Commissioners

6.33 The objections to impacts on fish populations are considered in Chapter 7 as the Commissioners see them predominantly as effects on the interests of human beings. There are also concerns about the problems of dredging and the sedimentation processes generally. They are covered in Chapter 5 as they involve sediment quality and water quality. The Commissioners' witnesses do not develop these concerns specifically with respect to impacts on wildlife and the natural fishery resource but are aware of the interaction of the factors involved.

Other objectors

6.34 The principal concern of objectors, including the Bridlington Protection Group, is the loss of beach and consequent obliteration of wildlife habitats. It is discussed thoroughly in Chapter 7 as a matter affecting the interests and amenities of human beings. Aspects dealing specifically with ecology and the conservation of fauna and flora, fish and shellfish and their habitats are reported in summary below and in Documents OBJ/P32, OBJ/P34, OBJ/P37, OBJ/P41, OBJ/P43 and OBJ/170.

6.35 From the standpoint of ecology and nature conservation the objectors say there must be a strong argument for retaining the pristine beach area involved in the proposed development on a coastline that is fast declining. There is criticism of the Council and their supporters for attempting to downplay the value of these natural resources by misleading the public, for example, by using photographs and other information to indicate the beach is largely covered with water most of the time, while in fact it is subject to the tide coming in and going out daily.

6.36 There is also resentment at the Council's reference to the beach as a brownfield site, which may reflect their low regard for this natural resource and a lack of appreciation that they are dealing with a pristine marine and coastal environment not an area of derelict land. The comparisons with other marina developments, such as those in Hull, Hartlepool and Port Solent, are rejected. Those marinas should not be regarded as similar schemes as they were not built on pristine beaches but on derelict land, with consequential benefits to the immediate surroundings.

6.37 Mr Ambler is concerned about destruction of wildlife habitats, particularly effects on the bird populations, and submits a list of bird species including 10 species of waders, 10 of gulls and five of terns that occupy the beach in Bridlington (Document OBJ/P43). He questions the planning context within which the development is proposed. He does not consider that enough attention is being given to the protection of biodiversity. He also expresses concern about effects on the populations of lugworms in the area, a subject that is considered in more detail in Chapter 7.

6.38 Mr Terrell is concerned about the impact of sediment plumes, a subject discussed in some detail in Chapter 5. He has reviewed the literature and refers to Document BPHC 29. He also questions the accuracy of the information in Table 3.3 of Document ERYC 2 based on the surveys of fauna and flora at sampling locations at the site of the works and surrounding area because of discrepancies in the conversion of GPS data to Ordnance Survey values. He questions the findings of the ES regarding the diversity and abundance of the benthic resource in this area and particularly the use of the word "barren" to describe the habitat; and he draws attention to the ornithological interest of the beach area.

Responses to the evidence of the objectors by the Council

6.39 Regarding the use of photographs in the ES the Council deny that the prints were chosen so as to mislead the public and refer to several examples to prove their point.

6.40 Regarding Mr Ambler's objection care has been taken to ensure that the principles of the development are in accordance with planning policies described in Documents ERYC 2 and ERYC 29. The EIA process and the inquiries are aimed at ensuring that the proposals would not lead to unnecessary or unjustified harm.

6.41 Responding to Mr Terrell, every effort would be made to limit the impacts on turbidity in the area immediately surrounding the proposed works. Some fine material would inevitably enter the water column but not to an extent that would cause significant damage to the environment. Irrespective of any minor differences between the two columns of data in Table 3.3 in Document ERYC 2, the validity of the survey to which they relate is not brought into question by discrepancies in the conversion of dGPS Lat/Long to OSGB by the GIS software package used.

6.42 The word "barren" has a specific meaning in the context in which it is used in the ES, and that appears to have been misinterpreted by Mr Terrell. It refers to a biotope type - a barren biotope - a system that does not contain many different species, but typically has high volumes of one dominant

species. In this case it also happens to contain a sub-biotope that is typified by lugworm populations, which confirms the conclusion Mr Terrell draws regarding the use of the area by bait diggers.

Findings

6.43 The Council have demonstrated that most aspects of the environment in Bridlington Bay that could be affected by their proposed scheme have been investigated in some detail with respect to the quality of the sediments and of the water. This is a wise precautionary step as the condition of the fauna and flora, and fish and shellfish populations, indeed the survival of some species, depends on the quality of the physical environment in the bay.

6.44 In using the ES as a basis for their case, the Council effectively deal with four matters of primary concern to the Secretary of State, which I discuss below.

The cSAC at Flamborough Head

6.45 The cSAC heads the list of matters needing careful attention. The Council have produced data, assessments and conclusions that provide a comprehensive picture of the environmental parameters involved. They argue that the fauna and flora of the cSAC would be unaffected by the proposed marina scheme if it were to be built. They consider that the infrastructure of the works, with its breakwaters, inner harbour, marina basin, the platform of reclaimed land on the South Beach, and associated structures, which is a proposed development that is on a very large scale indeed in terms of the town of Bridlington, would be unlikely to have any effect on the integrity of the cSAC. I have examined the facts and the arguments and also considered carefully the opinions of English Nature. Their comments about the position in so far as the cSAC is concerned, and the fact that they are not objectors, are most important, since they are the official agency with a primary responsibility to ensure that particular area is conserved and managed in accordance with the standards imposed by the EU and the Government. The Council's case that the integrity of the site would not be harmed by their scheme is convincing. I find that there are no serious grounds for doubting that the integrity of the cSAC would be ensured provided the development, if it goes ahead, is constructed according to standards established in the various discussions, and the scheme operated and monitored effectively thereafter.

Fauna and flora occupying the site of the proposed scheme

6.46 The second issue is the impact on the fauna and flora of the areas directly affected by the scheme, that is, the site of the proposed development and its immediate surroundings. The Council consider, on the basis of studies carried out for the EIA, that the effect could be described as a major adverse ecological impact. I would agree with that conclusion, as the scheme would effectively obliterate 13 ha of littoral foreshore habitat as well as 7.0 ha of sub-littoral habitat under the footprint of the works. This area is known to be a pristine natural environment, free from any significant pollution as Bridlington and its surroundings do not have industry or other enterprises that generate harmful effluent in the town's marine environment. The ES has indicated that the virgin sediment beds in this area do not contain pollutants, and the Council have maintained the beach and promenades to a very high standard.

6.47 The area involved in the works forms part of that portion of South Beach that is adjacent to the harbour. It borders the south wall of the harbour - the seaward side of the South Pier - a listed historic building which itself is now part of the natural environment having stood there undisturbed since the 1840s allowing marine wildlife habitats to develop on its walls and along its foundations. The South Beach is a designated "Bathing Beach" under the provisions of the EU directive, and a Blue Flag Award winner. Its high quality as a recognised seashore amenity alongside the historic harbour wall sends out another signal about the importance of this area of natural environment. It is an ecological feature and resource that penetrates into the very centre of the town.

6.48 The impact on fauna and flora described in the ES and by the Council's expert witness involves both sandy communities and rocky shore communities. We are told the sandy communities

are impoverished in the littoral area that would be buried under the works, and that they are of limited biological importance in terms of habitats and species. Objectors are very concerned about this matter. Furthermore, it is claimed that these communities are not unique or of any nature conservation interest. I suggest that the Council's argument relies on a limited appreciation of the meaning of the phrase nature conservation interest. I suspect their assertion in this respect is founded in the concept that for an area, habitat or species to be considered of nature conservation interest then it may need to be labelled with a designation of one kind or another, such as SSSI, to indicate a special ecological system of scientific interest. That would be a misleading concept. In this particular case the nature conservation interest is most important, as it is an integral part of the amenity beach that is adjacent to the town centre and the harbour. It therefore contributes directly to the appeal of the town for the public by providing localised wildlife habitats that are accessible to where people live and work and to tourists and other visitors that come to enjoy Bridlington's seaside leisure and recreational facilities, including observation of wildlife and their habitats. This is the issue in this case and not the regional or national significance of this area of seashore, which are matters that would concern English Nature and their responsibilities for the designated sites around Flamborough Head.

6.49 The Council's attitude to the ecology of the rocky shore communities is also suspect. They say that although the rocky shore communities that occur in the area are unique in the immediate local context, they consider that the proposed development would provide a larger amount of similar habitats for re-establishment of these communities. However, assuming that such habitats and their communities would ever come into existence, they would be situated somewhere else, and not as at present in the section of the South Beach close to the centre of the town, as that area, together with the south wall of the South Pier, with its own locally unique rocky shore communities of animals and plants, would have been buried under the new development. We are not given any significant information about the nature, location or extent of these proposed new habitats. Moreover, there are no specifications for the creation of new habitats or their management, and no scientific information or advice is provided upon which a judgement can be made about the location and role of such habitats in the future as part of the natural environment in the town of Bridlington.

6.50 A similar argument is applied to the ornithological interest. The habitats of the waders referred to would be buried under the works, and the ES says the birds would leave the town northwards as construction displaced their feeding and roosting areas. This is considered by the Council to be only a minor adverse impact because of the small numbers involved. I am surprised by this judgement as well, and concerned about its implications in terms of wildlife conservation. As the numbers of these interesting species are small then surely more, not less, concern should be expressed about their conservation. I do not consider that the Council are paying adequate regard to national or local policies for sustainable development and conservation of biodiversity in the light of their dismissive attitude towards the bird populations and other wildlife that would be destroyed or displaced by their scheme at this location. This is particularly regretful as these birds and their habitats are found close to the harbour and town centre where their presence gives enjoyment to local people and visitors. Again mitigation measures are proposed aimed at creating suitable rocky habitats on the western side of the works, but no scientific information or advice is provided about the prospect for success in securing alternative facilities for the return of these birds. In any case, the birds would be provided with artificial habitats at a distance of several hundreds of metres from the centre of the town, apparently on rock armour. That replacement habitat would not be comparable to the present environment of these birds, which is a highly visible natural area situated alongside the south wall of the South Pier that has an intimate ecological relationship with the adjacent wet beach that would be obliterated.

6.51 These attitudes demonstrate that there is a fundamental nature conservation matter that has not been correctly addressed by the Council. Concern about this matter is a central plank in the objections by the public to the proposed scheme. The central issue is ecological quality of the beach, and that quality is a matter of primary concern to the objectors. The South Beach at Bridlington is an unusually fine example of a seaside resort beach in that it not only runs alongside a promenade and a listed pier but also enters the centre of the town and the historic harbour. It provides the sea views

and the diurnal and seasonal changes in the tides and the sands for pubic enjoyment, and brings wildlife into the heart of the town. By removing this beach area the wildlife would be displaced and sent some considerable distance away from the harbour and town centre. In effect the works would isolate townspeople from this natural maritime environment for the first time in the history of Bridlington. I consider this prospect to be profoundly damaging to the interests of the inhabitants as well as visitors who come to enjoy the seaside. The impact on the natural environment through obliteration of habitats and species of fauna and flora must be seen as of a major adverse level of significance.

6.52 It is accepted that the cSAC is a site of European significance because of its specialist characteristics, and much effort has been devoted by the Council and others to ensure that the area suffers no damage. However, the South Beach habitats, though not designated in terms of special areas of national or European importance for the distinctiveness of their ecology and fauna and flora, are actually of great significance to the people of Bridlington and visitors to the town. This opinion is backed by the strong opposition to the burial of the beach and near shore sub-tidal areas under the works. It is remarkable that more attention has not been given by the Council to ensure a sustainable future for the sensitive natural features of the town's seaside by protecting the integrity of a vital section of the South Beach, which is ecologically the most diverse in the town, as a primary objective in the design of a marina scheme and associated urban development. This beach, with its EU bathing waters designation and Blue Flag Award, is composed of an unpolluted natural environment with distinctive biodiversity. In the light of the damage that would be caused to the natural environment, objectors question the planning context within which the scheme is promoted. I consider that it is certainly difficult to reconcile the scheme with policies relating to sustainable development, particularly in this instance Policy S1 and Policy N1 in RPG 12, which underline the responsibilities of local planning authorities in conserving biodiversity and protecting species and sites from direct or indirect damage (Document ERYC 39a). I consider the impacts of the works upon this natural resource of marine habitats and species on the South Beach at Bridlington to be at a major adverse level of significance. They are so serious as to be unacceptable. The mitigation measures proposed are not well developed or clearly specified. In my opinion, they would not be effective in ameliorating the loss of the littoral and sub-littoral habitats and associated wildlife that are important and conspicuous components of Bridlington's natural heritage, townscape and environment.

Pollution

6.53 The ES reports on all potential sources of pollution. The Council indicate that strong control over construction practices and operational procedures would be exercised. I do not consider that there is a potentially serious threat affecting fauna and flora, including fish and shellfish, in Bridlington Bay as a whole, and I am satisfied that the issues have been identified and properly addressed. Mitigation measures are proposed and regulatory practices would come into force if deemed necessary. There would be an adverse impact on organisms and habitats near the site of the works. It would diminish with distance from the site because hydrodynamic forces in the sea would dilute and disperse pollutants, including turbidity caused by release of sediments. The regulatory bodies would be closely involved in the control and monitoring procedures.

Fish and shellfish

6.54 The principal impact on the ecology of fish and shellfish resources would arise from turbidity of the water in and near to the site of the works. This would interfere with the physiology of the sedentary crustaceans and affect their growth and development. A localised impact on the productivity of the fishery is expected, a matter that is discussed in Chapter 7.

6.55 The ecological factors affecting the natural fish resource, and associated organisms such as lugworms used as bait, are effectively the same as those influencing the well being of marine fauna generally. Cleanliness of the water body, freedom from physical, chemical and biological pollution, and continued existence of fish habitats are crucially important. These criteria are recognised in the ES generally and with particular regard to the commercial fishery aspects of the fish and shellfish resources, as reported in Chapter 7, except with respect to obliteration of habitats on the South Beach.

Regardless of mitigation measures to be applied the fact remains that existing fish populations and their habitats, and bait digging grounds, would be removed entirely if buried under the footprint of the works.

6.56 The natural fishery resource would suffer an adverse impact from the scheme. However, beyond the footprint of the works the impact would be on areas that are not particularly important for the populations of fish and shellfish. The primary concern in that case is pollution, an impact the Council confidently expect to control effectively with the assistance of the other bodies involved. I consider their confidence is justified in that respect provided the measures referred to in the ES and in their evidence are rigorously exercised.

Chapter 7: effects of the scheme on human beings, and on buildings and other man-made features

The natural fishery resource

7.1 Potential impacts on the local fisheries of Bridlington would affect the natural fishery resource and, therefore, the commercial fishing industry and recreational fishing. Environmental matters mainly concern the natural resource and recreational fishing, and they are reported in Chapter 6.

7.2 Construction impacts would result in deterioration in water quality through increased sediment loading and potential fuel spills; increases in turbidity, noise and light affecting fish populations; fish mortalities through dredging activities; and damage to fish species through disposal of dredged spoil and reclamation. These effects are also discussed in Chapter 6.

7.3 Operation impacts would result in increased pressure on the natural resource arising from improved facilities for local commercial vessels; changes in existing hydrodynamic regimes potentially leading to loss or movement of existing habitat features such as sand bars that act as nursery grounds and spawning areas; a greater chance of fuel spills arising from an increase in boat traffic using the new facilities; a potential for fish mortality behind the lock gates in areas of poor water quality; and beneficial effects arising from the new breakwaters creating fish refuge habitats.

7.4 Construction impacts would result in a reduced amount of public access to the South Pier inhibiting recreational fishing activities in that locality; in effects on the near-shore fish populations to the north and to the south of the study area and recreational beach fishing in the Bridlington Bay; and in disruption of harbour access for rod and line boats.

7.5 The levels of significance of the impacts are reported in Chapter 6. The ES considers that operation of the scheme would result in an impact on the environment at a *moderate beneficial* level of significance by providing increased fishing facilities from the new breakwaters and by improving facilities for private rod and line boat operators.

Noise and vibration

Disturbance of residents and visitors arising from noisy civil engineering works during construction

7.6 Site construction activities may have a nuisance impact on the local community and tourists through the propagation of noise. Some receptors are close to the proposed works; for example, the retail kiosks underneath the sundeck along the part of Princess Mary Promenade that would remain open are approximately 60 m to 80 m from the southern boundary of the areas identified for site works.

7.7 Noise disturbance impact may also occur in residential areas at a higher elevation, such as South Marine Drive. Noise propagation paths travelling over water, which is acoustically hard, may contribute to this impact. Table 4.4 on Page 160 of Document ERYC 2 identifies the components of construction activity that pose the greatest potential risk of noise propagation and indicates the construction plant likely to be used.

7.8 The noisiest activities would be piling for the 1,820 m length of the sheet walls, to be carried out at a rate of 50 m² per day. That task would employ two pile crews for a period of approximately 40 weeks. They should be able to use vibrating pile drivers for the majority of the work, thereby reducing the noise levels significantly. The level of noise generated is dependent on the method used by the appointed contractor, the number of piling rigs deployed and the weather conditions. The

placing of rock armour from barges is the other potentially noisy activity. That source would be intermittent and is expected to take place during daytime hours over a period of approximately 18 months. There is a formula, recorded in Page 161 of Document ERYC 2 together with data and calculations, which is applied to give a more elaborate assessment of noise propagation from civil works.

7.9 Management of noise and vibration arising in demolition and construction activities is exercised under the Control of Pollution Act 1974, which empowers local authorities to control noise and vibration levels or emissions. Guidance is given in BS 5228: 1997, *Noise and vibration control on construction and open sites*. This gives recommendations for setting noise targets, but does not recommend specific noise limits. It also notes that it is not possible to provide detailed guidance for determining whether or not noise from a site would constitute a problem in particular circumstances. However, it is recognised in the ES that there are several factors that influence the acceptability of noise. They are site location, existing ambient noise levels, duration of site activities, hours of work, attitude of the site operators, and noise characteristics.

7.10 Levels of significance for impacts as measured at receptors are given in the ES, as follows.

major adverse	an increase greater than 20dB(A) in short-term noise significance levels
moderate adverse	an increase of between 15 and 20dB(A) in short-term significance noise levels
minor adverse	an increase of less than 10dB(A) in short-term noise significance levels

7.11 Using the predictions and background noise levels indicated above, traditionally hammered piling would represent an increase in noise levels greater that 10dB(A). This value does not, however, take into account meteorological conditions and the barrier effect of say the existing sea defence wall. During the night, noise that disturbs sleep would be deemed an impact at a *major adverse* level of significance. During the day, noise without mitigation may also represent an impact at a *major adverse* level of significance.

7.12 Mitigation measures are proposed. The Council's Environmental Health Department highlights the need for restrictions to be placed on noisy construction activities, for example, piling and placing of rock armour. They would take the form of sensitive programming of the work to avoid 'sleep disturbance', rather than establishing critical noise limits. The Council indicate that heavy construction activities should be limited to the hours 07.00 to 22.00, Mondays to Saturdays, and that they would only permit quieter activities on Sundays and Bank Holidays.

7.13 The Council are also mindful that there would be a trade-off between completing the scheme as quickly as possible while not causing detrimental experiences for tourists. They recommend five procedures to be followed by contractors, which are described in the ES. These measures, summarised below, combined with a responsible approach to contract supervision, should reduce construction noise to practicable levels.

(1) The contractor should contact the Council's Environmental Health department at an early stage to arrange the construction activities on site.

(2) Where tide times and weather conditions compromise the programmed times, referred to in Paragraph 7.12, above, contact should be made with the Environmental Health Department. Noisy construction activity outside the hours mentioned should not be carried out without the prior agreement of the Council.

(3) Contractors would be required to follow the good practice and housekeeping guidance and safety procedures contained in BS 5228:1997 and other relevant documents.

(4) Construction plant, such as generators and pumps, should be fitted with appropriate silencers and acoustic enclosures and/or hoods in order to minimise the effects of noise.

(5) Stationary noise sources, such as generators, should be sited as far as possible from noise sensitive receptors.

7.14 Successful adoption of the mitigation measures proposed would reduce the impacts. The ES considers that the impact of noise caused by construction of the scheme would be at a *minor adverse* level of significance and of short-term duration.

Noise disturbance to residents and visitors caused by HGV movements, and activities during construction and operation of the proposed new harbour

7.15 The majority of heavy materials for the civil engineering works would be brought in by sea, but some by road. The number, duration and frequency of activity, notably lorry movements over a period of time, are factors that need to be taken into account when determining significance. An indication of the HGV movements that would occur is given in the ES.

7.16 The ES states, the movements of HGVs would not be perceptible by the majority of people although their passage along South Marine Drive may cause an impact at a *minor adverse* level of significance of short-term duration and annoy some people. The mitigation measures suggested for traffic, referred to in Chapter 8, should go some way to minimise this impact.

7.17 There are no predicted significant impacts associated with noise levels that would arise from the operation of the proposed marina. The only new harbour activity to emerge would be the operation of the lock gates, and any noise associated with that is expected to have an impact at a *negligible* level of significance over and above the level of background noise generated by the existing harbour.

7.18 The new fishing facilities would be located at some distance from the existing provision and take the noise source away from the town centre. The ES considers this effect would be an impact at a *minor beneficial* level of significance.

7.19 The ES refers to potential sources of noise arising from the proposed topside development on the reclaimed land. It reminds us that the impacts from that source would be the subject of a separate EIA.

Vibration during construction

7.20 The potential impacts from vibration would arise from piling activities and the passing of HGVs during construction. Guidance is provided in BS 6472: 1984, *Guide to evaluation of human exposure to vibration in buildings (1Hz to 8Hz)*, which indicates thresholds of perception and acceptable levels of vibration. BS 7385: Part 2: 1993, *Evaluation and measurement of vibration in buildings - guide to damage levels from ground borne vibration*, recommends that the maximum peak particle velocity (PPV) of 15 mm/s at 4Hz, increasing to 20 mm/s at 15Hz, should be used for residential buildings.

7.21 During piling activities the maximum level of vibration expected at a distance from a drop hammer piling rig of less than 100 m could be in the range of 2. 0 mm/s to 3.0 mm/s. Vibration from piling is therefore not likely to be discernible at the houses and hotels nearest to the works, for example South Marine Drive, because of the distance and elevation of those properties above the level of the beach. No impact is therefore expected.

7.22 As indicated in Chapter 2, Paragraph 2.55, people show concern that vibration might cause damage to their property. This is usually a perceived problem and often unfounded in that substantially higher levels of vibration than are tolerable for humans are necessary to cause structural damage to buildings. The small rate of increase in HGV movements during the construction phase is unlikely to cause a vibration issue.

Tourism, recreation and navigation

Disruption to angling from nearby shores and the existing harbour wall of the South Pier

7.23 During construction, recreational fishing activity would be reduced, especially off South Pier and nearby beaches. The platform of reclaimed land to be built on the beach against the south wall of the South Pier would extinguish the prospect of any further fishing in that area.

7.24 Recreational fishing is extensive in Bridlington, especially during the summer months when tourists fish off the South Pier, mainly for crabs. Construction works would prevent this activity thereby affecting tourism, and the ES considers it would be an impact at a *moderate adverse* to *major adverse* level of significance.

7.25 Mitigation measures are proposed to provide information in notices on site and spectator-viewing platforms. However, recreational fishing would be disrupted even with mitigation measures in place resulting in a residual impact at a *moderate adverse* level of significance.

Disruption of off-shore recreational and leisure navigation through the presence of the works, and dredging and transportation vessels

7.26 Dredging the marina basin and navigation channel would take place over a period of between one to two months. The dredging vessel, working intensively in the area to the south of the existing harbour entrance, would interfere with recreational activities such as use of jet skis and navigation of yachts. Vessels importing fill material and rock armour to the site would increase the risk of collision and other accidents at sea, thereby leading to a loss of earnings for the two speedboats, the pirate ship and dive boats operating from the harbour.

7.27 If construction works and related vessel movements in the area are not regulated or mitigated, the potential for collision and increased disruption to recreational craft would result in an impact at a *moderate adverse* to *major adverse* level of significance. Risks to human health and safety would be minimised by adopting the mitigation measures described in Paragraph 7.28, below.

7.28 Six mitigation measures are proposed, as follows.

(1) Consent required under Section 34 of the Coast Protection Act 1949 may be given, subject to conditions that could require imposing controls on vessel movements.

(2) Consultation with local boat owners and marine users would be carried out to agree the best approach to the problems.

(3) The works would be clearly demarcated and local marine users notified of the periods when dredging occurs or rocks are delivered.

(4) Alternative access routes and mooring facilities would be created if the main approach channel becomes inaccessible so as to minimise loss of earnings.

(5) Construction activities would avoid peak periods of recreational activity, such as regattas, which occur in the summer months.

(6) A code of practice for construction vessels would be set up for contractors to adhere to when in the vicinity of Bridlington Bay, and similar guidelines given to local marine users.

7.29 The ES states, if adequate mitigation measures are agreed and adhered to, then there would be a residual impact at a *minor adverse* level of significance.

Effect of increased noise, light and vibration on recreational and leisure users caused by construction activities

7.30 Disturbance would increase noise and light levels, mainly due to dredging activities, construction of the new breakwaters and quay structures, and the reclamation process. It would affect visitors and local people using Bridlington's recreational and leisure amenities. The control of noise and vibration arising from construction activities is exercised under the Control of Pollution Act 1974, and guidance is given in BS 5228: 1997, *Noise and vibration control on construction and open sites*.

7.31 The ES states, the potential impact of construction on leisure and recreation activities in the area is likely to be at a *moderate adverse* level of significance if managed and mitigated adequately. All sources of noise, vibration and light would be controlled to ensure that disruption of the local environment from these impacts is minimised.

7.32 The mitigation measures proposed are summarised below.

(1) All contractors would follow good practice guidance detailed in BS 5228 (Part 1 1987 - Basic information and procedures for noise control), *Construction (Design and Management) Regulation, and Health and Safety Executive Regulations/Guidance.*

(2) Construction machinery should have silencers fitted where possible.

(3) All works and ancillary operations on the site would be carried out in reasonable working hours.

7.33 The ES indicates that construction impacts would be of short-term duration. Implementation of the measures indicated in Paragraph 7.32, above would reduce the potential impact to a *minor* to *negligible* level of significance.

Lack of access provision for disabled persons during the construction phase

7.34 The Council provide services for passive recreation and access to the sea front, for example, rest areas, pedestrian zones and retail shops along the South Promenade. Access for disabled people may be at risk during the construction phase. The Disability Discrimination Act 1995 makes it unlawful for a service provider to discriminate against a disabled person, such as, for instance, by refusing to provide (or deliberately not providing) any service that it provides to members of the public. Denial of access for disabled persons to facilities would constitute an impact at a *moderate adverse* to *major adverse* level of significance. However, the ES indicates that successful implementation of the mitigation measures set out in Paragraph 7.35, below should reduce the impact to a *negligible* level of significance.

7.35 Mitigation proposals indicate that the contractor must provide adequate measures during the construction phase to maintain access for disabled people along the South Promenade. Where access to public facilities is not permitted during construction then the contractor must ensure that alternative arrangements are made available for disabled people.

Construction and operation effects involving rock armour as a safety hazard

7.36 The presence of rocks and boulders represents a safety hazard for anyone who gains access to the rock armour revetments. This environmental impact could result in personal injury. Mitigation is proposed by providing appropriate signage, erected to discourage or deter public access to the rock armour; and by ensuring that the specification for the placing of rock during construction should include relevant clauses to minimise health and safety risks, for example, the close packing of rock boulders to minimise voids or gaps.

7.37 The ES indicates that implementation of the measures in Paragraph 7.36, above would reduce the potential impact to a *minor adverse* level of significance.

Effects arising from the presence of an increased number of recreational craft in the area, deeper channels and changes in wave behaviour affecting small craft

7.38 The construction of approximately 500 new berthing spaces in Bridlington would create three potential impacts. First, a greater number of smaller craft would have an impact on operators of commercial vessels by causing disruption and delay affecting fishing and recreational boat trips. Secondly, additional small craft would increase risks and hazards for other recreational users in Bridlington Bay. Thirdly, the presence of additional craft would have positive and negative impacts on shore-side facilities and amenities both in the proposed scheme and in the town centre; examples include car parking, increased volume of traffic, and noise and lighting impacts.

7.39 Unless adequately managed, and subjected to mitigation measures, the increased number of craft would amount to an impact on the environment at a *moderate adverse* level of significance.

7.40 The following mitigation measures are proposed in the ES: constant and open communication should be maintained between all users of craft to ensure that conflicts are solved quickly or avoided altogether; a code of practice should be drawn up for small craft; and entry into and exit from the marina and the channel should be closely observed and regulated by the harbour authority to minimise hazards through collisions.

7.41 The ES indicates that implementation of user management proposals, together with the mitigation measures indicated in Paragraph 7.40, above should ensure that the impact would be at a *negligible* level of significance.

7.42 The environmental changes arising from dredging of the navigation channel and marina mouth would deepen the water in and around the site and reduce the speed of tidal currents. There would also be a significant reduction in wave height in the marina mouth as compared to wave height currently experienced in the existing harbour. These changes are expected to have an impact on small craft at a *negligible* level of significance. Indeed, the reduced wave heights at the entrance to the proposed marina are seen as an impact on vessels at a *moderate beneficial* level of significance.

Ship-wash affecting small craft during the construction phase

7.43 A large dredger or transport vessel travelling at speed would create significant ship-wash, affecting the safe navigation of smaller craft. The ES indicates that the effect would result in an impact at *moderate adverse* level of significance unless mitigation measures are taken.

7.44 Mitigation proposals involve imposing speed limits for construction vessels to ensure that smaller craft are not affected by their wash, within limits in a code of practice. Construction works would be phased to avoid peak times of recreational activity in and around the existing harbour and vessels routed to avoid main areas for such activity.

7.45 The effects of ship-wash would be of short-term duration and the ES considers that implementation of the mitigation measures, indicated in Paragraph 7.44, above would reduce their potential impact to a *minor* to *negligible* level of significance.

Construction phase effects on archaeological sites, wrecks and finds

7.46 Known sites and finds occur at the landward end of the harbour and no impact on them would be expected to occur. However, the potential for disturbance to features in the near-shore areas not already identified does exist. Wrecks may be preserved in the benthic sediments and there is a potential for an impact to occur arising from damage or destruction to these features at a *minor adverse* to *moderate adverse* level of significance. A mitigation proposal recommends that the results

of the geophysical surveys of sediments that are to be disturbed should be reviewed by an archaeologist, and avoidance action taken if a significant feature is found.

Effects on historic landscapes and historic environmental features

7.47 The coastline of Bridlington Bay area has eroded rapidly for many centuries and no impact on historic landscapes is therefore anticipated. Sections of the coastline to the south and to the north of Bridlington are continuing to erode; consequently archaeological sites have been destroyed or are at risk. The coastal review, referred to in Chapter 4, Paragraph 4.4, did suggest that the proposed scheme, if constructed, would cause a readjustment of the beach lines. This could increase the potential for archaeological sites to be destroyed locally, but this effect would be limited in those areas characterised by groyne fields. Potentially, the impact on the archaeological resource, including Scheduled Ancient Monuments of local importance, would be at a *moderate adverse* level of significance.

7.48 A modelling exercise would be done at the detailed design stage to find out exactly where changes in the coastal regime would cause a change to the patterns of coastal erosion. Sites of regional or national value may be protected or recorded in that way, but others, and the information held within them, may be lost without record. Preservation by record is considered the last option, as all of the information held within a site is unlikely to be recorded due to inherent limitations in archaeological excavation and recording techniques. Consequently, a residual impact at a *minor adverse* to *moderate adverse* level of significance would remain.

Effects of construction on local and regional sub-aqua activities

7.49 Sub-aqua diving activities occur mostly over the reef system and marine biological habitats near Flamborough Head. Diving on wrecks occurs, mainly at some distance from Bridlington. The proposed works would cover one wreck, 'The Potomac'. Little now remains of the wreck and the ES considers that the potential impact on recreational sub-aqua diving would be at a *negligible* level of significance. Mitigation proposals suggest consultation should be carried out between the Council, the local dive club and dive boat operators, the Humberside Archaeology Partnership and the Wrecks Office of the Royal Commission on the Historical Monuments of England.

The cases of the parties with respect to effects on human beings

The Council

7.50 The principal issues are effects arising from the construction phase, such as increased noise and vibration, disruption of commercial and recreational boating activities in and near to the site of the works, as well as longer-term impacts on some of those activities during the operation phase. Construction would disrupt normal activities of boats in the area and mitigation proposals are reported in the ES.

7.51 Noise and vibration are important matters, especially their effects on people during the construction phase. Noise would affect receptors near the site at seashore level as well as elevated properties such as the houses on South Marine Drive. Piling noise in particular has a potential to cause disturbance. Mitigation proposals in the ES are regarded by the Council as an effective means of reducing these impacts. They consider that vibration would not be a serious impact and that mitigation would not be necessary.

7.52 The impacts on tourism and recreation, and associated navigation, are of considerable significance for the longer-term. The Council say they are mostly impacts at a moderate adverse level of significance. The main issues, including recreational fishing, are reported in Paragraphs 7.23 to 7.29, above and in Chapter 6.

7.53 Historic landscapes are unlikely to be severely affected as most of the land surfaces along the coastline in this area have disappeared as a result of erosion over the years (Paragraphs 7.47 to 7.49, above). An archaeologist would be asked to review site investigation results, determine if further

survey is required and consider any measures that may be taken to avoid damaging historic features such as wrecks. The Council consider that the mitigation measures proposed would help avoid damage to historic features.

7.54 Many of the observations made about historic landscapes also apply to archaeological features. The known sites of interest occur in the town of Bridlington and its hinterland, landward of the site of the works. The main concern of archaeologists is impact on wrecks that may lie in the area directly affected by the works and mitigation involving consultation with the Humberside Archaeology Trust is proposed. The Council also refer to the protection that would be afforded to the harbour piers, which were listed after the EIA had been carried out. This matter is considered in the report of Dr Moseley.

7.55 Regarding amenity, the Council consider that the loss of what they refer to as "beach", in inverted commas, to the footprint of the works would represent a minor adverse impact for community use. This matter is considered in detail in Chapter 9. They argue that the area in question is largely characterised by fine material, rather than 'beach sand', and lies below mean high water mark and is covered twice a day by the tide. Visitors predominantly gravitate to the beach area south of the proposed works. For these reasons, the Council claim that the 'beach' area referred to is not heavily used. It has one small café, and no vendors locate in this area. Most of the facilities provided for the South Beach are located further south. They also maintain that seasonal movements of sand do allow the build up of sand adjacent to the promenade in this area, and this amounts to an area of approximately 0.3 ha to 1.7 ha. With the works in place they claim that visitors would still be able to use the beach and promenade nearest the harbour. This point would, they say, simply have moved 300 m southwards. They conclude that due to the expanse of the beach in the vicinity of Bridlington, the extent of the available resource is not limited and the receptors are mobile.

The objectors

The Commissioners

7.56 Mr C J Wright and Mr B H Raper are concerned about the smell of bait used for whelk fishing, namely dead dogfish, which is extremely smelly (Documents OBJ/P3 and OBJ/P11). They say it is impossible to establish fishermen's warehouses adjacent to residential development as indicated in the proposed scheme.

7.57 Mr P B Jewitt, in a written representation, is concerned that if the scheme is built then part of the South Beach disappears, and Bridlington would cease to attract families to the beach (Document OBJ/P15). He also states, the scheme would be a great upset to most residents in the area, especially during the construction phase.

7.58 Mr W H Trevitt is concerned about the sloping rock armour of the proposed breakwaters, which would make these structures virtually unusable for foreshore fishing (Document OBJ/P27).

Responses to the Commissioners' evidence by the Council

7.59 The Council note the concern about the potential for the smell of bait used in whelk fishing affecting residential properties in the topside development. The decision regarding that matter would be the responsibility of the harbour authority to exercise available options to deal with the problem such as by providing bait-freezing facilities.

7.60 Regarding Mr Jewitt's representation, the Council claim that the area of beach that would be lost to the footprint of the works is largely characterised by fine material below mean high water mark rather than beach sand. They elaborate along the lines reported in Paragraph 7.55, above saying that the public does not heavily use this beach area, and visitors generally gravitate southward of the site of the proposed works.

7.61 The Council also confirm that, with the works in place, families would still be able to use the beach and promenade nearest the harbour; this point would simply have moved southwards. Due to

the expanse of beach in the vicinity of Bridlington, the extent of the available resource is not limited and the users are mobile.

7.62 Regarding being a great upset, disruption during the construction phase would inevitably occur but limited by the requirement for the contractor to maintain good working practices and a tidy site, by adhering to an environmental management plan and the Environment Agency's pollution prevention guidelines. The measures include regular brushing of roads, damping down vehicle wheels and keeping in close touch with the Environmental Health Officer of the Council and the local community.

7.63 The Council claim that the ability of the public to carry out foreshore fishing would be unchanged if the proposed works are built. Furthermore, they state, once the proposed marina became operational, line fishing from the North Pier would not be affected by the works, with the harbour arm largely remaining in its current state. The loss of fishing from the South Pier would be partially replaced by fishing from the quay wall within the eastern breakwater, running from the lock to the existing southern breakwater head, where the new quay would be approximately 3/5ths the length of the southern harbour arm. If the scheme is not built the Council say that the requirement to reinforce the existing harbour arms would remain, and most likely involve the use of rock or scour blankets, and consequent effects on fishing.

7.64 The Council add that the proposed marina itself would increase the amount of craft able to carry out recreational rod and line fishing and provide improved facilities for charter boats. The new breakwaters would yield additional areas for angling and they are likely to support healthy fish populations as an available resource.

Other objectors

7.65 Mr K Ambler uses South Beach and other areas south of the harbour for digging for bait, mainly lugworms, and for fishing off the South Pier. He objects to the loss of these facilities if the scheme goes ahead. He submitted a petition signed by about 250 people, living in Bridlington and elsewhere, who would like to retain the right to fish off the south side of the harbour wall (that is, the South Pier) and to dig for bait in front of the Spa (Document OBJ/52). Some of the signatories indicated they had fished in the area for over 60 years.

Responses by the Council to the evidence of Mr Ambler

7.66 The Council agree that construction activity would obviously affect access to sites used for fishing and bait digging where they exist in the area to be occupied by the scheme. Subject to considerations for public safety while construction is in progress bait digging would be possible both to the north and to the south of the site of the works. In the vicinity of the South Pier this amenity would be lost once construction had been completed, as the beach involved would be covered under the platform of reclaimed land and associated structures.

7.67 With respect to fishing, once the scheme is completed, line fishing from the North Pier would be restored, with the harbour arm largely remaining in its current state. The Council also claim that the loss of fishing from the South Pier would be partially replaced by fishing from the quay wall within the eastern breakwater running from the lock to the existing southern breakwater head. Fishing can also take place from the beaches to the north and to the south of the site of the proposed works.

Findings

7.68 The natural fishery resource has been discussed in Chapter 6. In Chapter 7 the emphasis is on the environmental aspects of commercial and recreational fishing activities. The ES claims that the overall effect, in the longer-term, would be an impact at a moderate beneficial level of significance. This conclusion is based on the expectation that new structures, especially the rock armour in the scheme, would be attractive as fish habitats. However, construction impacts would cause much disturbance to fish and fishermen, and operation of the scheme would bring more boats into the area and intensify fishing activities.

7.69 Tourism, recreation and navigation would be variously affected. During construction of the works disruption of angling from nearby shores and the existing harbour wall of the South Pier would amount to a moderate adverse level of significance. This impact would be at a major adverse level in the summer months. There are certain mitigation measures, mainly giving information about the scheme, but they are not likely to have much influence in reducing the severity of the impact. The ES says that with mitigation measures in place there would remain a residual impact at a moderate adverse level in the summer months. I agree with that view and it is a matter that will need careful consideration by the Inspector because the impact in the longer-term would be so adverse.

7.70 During construction there would be disturbance of vessel movement in the area. This would be mainly an impact on leisure craft at a moderate adverse or major adverse level of significance with consequent risks to health and safety and some indirect effects on the environment. The impact would arise from increases in the number of craft in the area, ship-wash, deeper channels and wave behaviour. However, the Council consider that the impact could be reduced to a minor adverse level by the application of some six rigorous mitigation measures. I agree with their assessment provided the mitigation measures are successfully implemented.

7.71 Noise and vibration profiles are considered in some detail in the ES, and there are data available. Noisy civil engineering works would be an impact at a major adverse level of significance, even during daytime, unless mitigated. Several mitigating measures are proposed. If successfully applied they are expected to reduce the impact to a minor adverse level of significance and it would be of short-term duration assuming the construction work were completed according to the time scale estimated by the Council. I agree with the assessment and consider the mitigation measures would be effective as described.

7.72 Although some vibration would arise, mainly from piling activities, it is not likely to result in an environmental impact of any significance. It is usually a perceived problem that rarely amounts to an impact. I agree with the assessment.

7.73 Noise, light and vibration during construction would affect leisure users. The potential impact could be at a moderate adverse level of significance but of short-term duration. The ES considers this could be reduced to a minor or negligible level through the application of mitigation measures. I agree with the assessment.

7.74 Danger to the public from rock armour and lack of provision for disabled access particularly along the South Promenade are other potential impacts at adverse levels of significance. These could be reduced to an impact at minor adverse level of significance through the implementation of mitigation measures. I agree but have some reservations regarding danger from rock armour to children playing on the beach. Objectors are worried about the possible appearance of such a structure on the popular South Beach.

7.75 Effects on historic landscapes, archaeological sites and associated sub-aqua activities are given considerable attention in the ES. They are at minor or moderate levels of significance in most cases. The impacts would be reduced by implementing mitigation measures and through regular consultation with archaeological interests. I agree with the assessment.

7.76 Effects on the South Pier, a historic feature, and on the adjacent part of the South Beach are not considered in any detail in this section of the ES. These matters do cause much anxiety among the objectors. Several of the impacts in these respects, which are by far the most serious in the eyes of the public as they affect their immediate environment and amenities, are discussed in particular in Chapter 9. The Council respond to the Commissioners regarding the recreational fishing opportunities by accepting that the facilities would disappear on the South Pier and the beach below. These are long established recreational fishing areas and the replacements suggested by the Council for that activity, as well as the associated bait digging that occurs on the South Beach, are not specified in any detail and may be regarded as unacceptable or unrealistic alternatives by the public. I consider the effect to be a moderate to adverse level of significance, and that conclusion is broadly in accord with the ES.

7.77 Regarding the loss of beach, this matter is dealt with in detail in Chapter 6 with respect to loss of wildlife habitat and in Chapter 9 with respect to loss of landscape character and views and associated amenities. The effects in each case would have a pronounced impact on public enjoyment of the area. In this Chapter (Paragraph 7.55, above), I refer to the Council's response to objections about the loss of usable beach whereby they regard the public as "receptors that are mobile". They assert that the public would still be able to use the beach area nearest the harbour the point at which they could do so having simply moved 300 m southwards. Assuming the public would move southwards that distance it is misleading to suggest that otherwise their beach would be unaffected. The new northern boundary would in fact be 530 m further away from the existing northern boundary of South Beach and the root of the South Pier of the harbour. There would be no historic harbour wall to admire and they would find themselves located instead alongside a rock armour breakwater stretching seaward from the promenade for a distance of more than 620 m. This radical change in the appearance and location of the beach as an amenity for public enjoyment is primarily an issue of landscape and views, including conservation of wildlife habitats and biodiversity. It is widely recognised that the new breakwater structure that would form the new northern boundary of the South Beach is a less appealing, and possibly less safe, prospect for the public than the present harbour wall. The matter is considered further in Chapter 9.

7.78 I regard the matters referred to in Paragraphs 7.76 and 7.77, above that affect human beings as contributing to the overall assessment in the ES regarding public amenities in the area adjacent to, and to the south of, the harbour. That means that the effects of the works on the amenities available for public enjoyment provided by the fauna and flora and their habitats in the South Beach area and by the landscape and views in the vicinity amounts to an environmental impact at a major adverse level of significance. Effects on access to the South Beach and resultant human behaviour in the area are another undesirable impact that would arise by building the works on this seashore. There are strong objections at the inquiries and in written representations to these impacts and I share the concern of the objectors especially as no effective mitigation proposals could apparently be applied.

7.79 The Council are suggesting that the public would simply have to move away from the area to be developed so as to use another part of the South Beach further to the south. However, they provide no evidence to show that such movement would take place without resistance or that their suggestion is generally acceptable to Bridlington residents or visitors to the town. I suspect, on the basis of the strength of the objections to their proposals, that the effects on human beings in this respect can only be regarded as at a major adverse level of significance. I am not persuaded that the Council have provided effective mitigation measures to reduce the severity of the impact on the South Beach environment in so far as it affects the interests of human beings. I doubt whether any mitigation is possible because of the scale and severity of the impact of the works. I consider the impacts of the proposed scheme on the environment and amenities offered to the public by the South Beach are at a major adverse level of significance. They are so serious as to be unacceptable.

Chapter 8: effects of the scheme on air and climate

Construction phase impacts arising from atmospheric emissions generated on-site affecting local residents and businesses

8.1 During site clearance, reclamation and other civil engineering works emissions to the atmosphere would occur. The main sources and their characteristics are:

- dust and particulates from reclamation materials and from the movement of site vehicles and mobile plant on unsurfaced ground;
- wind-blown dust from building site operations and granular materials stored in open stockpiles;
- exhaust gases from mobile plant, including delivery vehicles; and
- miscellaneous emissions given off by paints, building materials and consumables during the final phases of construction.

8.2 Emissions are discussed in Chapter 2, Paragraphs 2.50 to 2.52. They are subject to control by the Council by virtue of the provisions of Part III of the Environmental Protection Act 1990 and other regulations. The local authority may secure abatement under these powers if a nuisance occurs, or is likely to occur or re-occur.

8.3 The traffic study report in the ES indicates that during the tourist season the main through route to the sea front, by way of the Carnaby Industrial Estate and South Marine Drive, are not near the limits of capacity (Document APP/P23). The environmental issues are discussed in Chapter 2, Paragraphs 2.68 and 2.69.

8.4 The ES states, the effects of emissions would be transient in nature and impact on the environment is considered to be at a *minor adverse* level of significance. It also considers this impact can be reduced to a *negligible* level of significance provided that the designers of the scheme and the contractors carry out appropriate mitigation measures, which are described in Paragraph 8.7, below.

Atmospheric emissions generated on-site affecting local residents and businesses during operation of the scheme

8.5 The longer-term operation would give rise to atmospheric emissions from vessels using the facilities and vehicles that travel to and from the platform for the proposed topside development along the local road network. They would contribute negatively to targets for air quality levels set by the Council. An increase in traffic-related emissions from any topside development is not considered in the ES.

8.6 Capacities of the receiving roads are well within their limits and would be unaffected by traffic associated with the scheme. This aspect would need to be assessed as a part of any EIA that may be required for the topside development if that proposal is implemented, and should take account also of the proposed park and ride facility on the Carnaby Industrial Estate.

8.7 Mitigation proposed for impacts require the main contractors to inform the Council's Environmental Health Department that construction schedules pay due regard to the community. The Council expect physical measures to be taken and sound practice applied to minimise the release of emissions.

The cases of the parties

The Council

8.8 Mr D W Rennie, representing the Council, is the Head of their Transport, Highways and Environmental Services. He holds a BSc degree in applied science and a diploma in public administration, and he is a member of the Institution of Civil Engineers. He prepared his evidence (Document APP/P23) in accordance with the transport impact assessment guidelines produced by the Council, which complement the Government's PPG 13 on transport (Documents ERYC 89 and 89A). He includes all the potential development in the scope of his evidence, that is, the proposed 500-berth marina and the topside development on the land reclaimed from the beach and the sea. In transport terms it is the topside development that is expected to produce the most impact. The construction and operating traffic for the proposed marina is not expected to be significant. However, he argues that the wider impact of the topside development needs to be considered at the same time to ensure that the whole project is properly assessed.

8.9 Mr Rennie deals in his evidence with accessibility, economy, environment, safety and integration. Regarding the transport environment, he says that the unique location of the proposed marina would improve the opportunity to encourage the use and improvement of sustainable transport modes. It would provide a more sustained demand through the year and thereby improve the prospects for the success and usage of the park and ride scheme at Carnaby, which is designed to enhance the quality of the transport environment. He also deals with existing and future traffic conditions, car parking, the Local Transport Plan (Document ERYC 40), traffic management, and cycling and walking. He does not identify specifically any aspects that would cause gross deterioration to the environment such as failure of the road system to meet additional demands from vehicles or a sharp increase in atmospheric pollution.

Objectors

The Commissioners

8.10 The Commissioners are concerned about two primary issues - the problems of vehicle parking in Bridlington and the park and ride facility at Carnaby. They consider there would be inadequate parking facilities to meet the demands arising from the proposed scheme, and that the proposed Carnaby park and ride facility, located 3.5 km from the town, is ludicrous.

Other objectors

8.11 Other objectors, including 15 people who submitted written representations, express similar concerns.

Response to the evidence of the objectors by the Council

8.12 The Council say they would provide parking in the town in accordance with national guidelines and standards for marina users and visitors. The park and ride facility at Carnaby, provided through the Local Transport Plan as part of a wider strategy for Bridlington, is a more sustainable method of dealing with transport over the next five to 10 years. They consider that the facility would contribute to the transport needs of the proposed marina scheme.

Findings

8.13 I have considered the effects of the proposed works on air and climate as described in the ES and by the Council's witnesses. The proposals would result in an increase in traffic during construction and operation of the scheme. Many of the impacts from traffic are discussed in Chapter 7, Paragraphs 7.6 to 7.22, under the headings noise and vibration. The issue of air pollution does not feature prominently in the cases of the objectors.

8.14 It is clear that changes in vehicle emissions would occur, but they cannot be regarded as a major new impact. There is the opportunity to contain the growth in traffic volume in the town by providing the park and ride scheme, and I have not been persuaded that the other changes in the use of roads and vehicle parking constitute an environmental impact of such a magnitude that it could not be accommodated in accordance with the accepted criteria and standards adopted by the Council's transport department. The evidence does not show that the effects of the works on air and climate would constitute an unacceptable environmental impact.

Chapter 9: effects of the scheme on landscape and views

Effects of the presence of civil engineering works in the construction phase

9.1 The end products of the construction phase would have two main elements, namely the breakwaters and the lock, and the platform of land in the sea and on part of the South Beach. The breakwaters would consist largely of rock revetments, the rock arriving by sea. The main visual impacts would therefore be the barges and the hydraulic grabs used for placing the rock during construction. The ES considers the effect is likely to be of short-term duration, and the impact on the environment at a *minor adverse* to *moderate adverse* level of significance, depending on the proximity of the visual receptors. The platform would be created by depositing dredged material obtained mainly from licensed sites situated off-shore and pumped to the works from barges. The main visual impacts would be the dredger, moored off-shore, the pipeline and the earthmoving machinery used for spreading and levelling the fill material. The presence of these plant and machinery would be expected to produce an impact on visual receptors at a *moderate adverse* level of significance.

9.2 The following mitigation measures are proposed.

(1) Due to the constraints imposed by the road system in the town, and the restricted site access at both the Spa and North Pier, most of the materials must be delivered by sea, and movement of plant using the roads kept to a minimum.

(2) Site lighting should be kept to a minimum consistent with safety and codes of practice, and the use of towers not allowed.

(3) The site should be fenced during construction for public safety while allowing for spectators to see the work.

9.3 The ES considers that mitigation measures should ensure that the effects on landscape character and visual receptors are reduced to an impact at a *minor adverse* level of significance. It also considers that the construction works could become a point of interest, as experienced in other coastal engineering schemes; and if that happens in Bridlington, then the impact on visual receptors, as it affects people engaged in passive recreation, could be at a *minor beneficial* level of significance.

Effects on landscape character and visual receptors during the operation phase

9.4 While the proposed topside development does not feature in the ES, the change in configuration of the coastline and local topography caused by the platform of reclaimed land, the marina basin and the rock armour breakwaters are highly relevant. The effects on landscape character and visual receptors are reported below.

9.5 The effects concern civil engineering works, including the breakwaters, marina lock and undeveloped platform of reclaimed land created by these works, together with the marina. They do not take into account any development that may take place on the reclaimed land.

9.6 If the topside development proposed for the platform of reclaimed land in the future were to be permitted, then the effects described in the ES would be of short-term duration only. The impacts of any ultimate topside development or of any transitional scheme to occupy the reclaimed land in the meantime would be additional, and would affect the nature and severity of the impacts described in this report. They cannot be accurately specified at this time. The principal impacts of the scheme in the Works Order are summarised below.

Effects on landscape character

The scale of the harbour

9.7 The scheme would extend the area of the existing harbour at Bridlington. It is claimed by the Council that, as such, it should not alter the character of what is already a working area catering for both commercial and pleasure craft. However, the scale of the scheme is considerable, with the area of land and sea encompassed by the new breakwaters amounting to more than four times the size of the existing harbour according to the scaled drawings in Document ERYC 3. The ES states, it is the scale rather than type of proposal in the scheme that is of concern, including the extremely large area of reclaimed land for ultimate development that would be created. The effect is likely to be an impact at a *major adverse* level of significance, although it would depend on the visual perspective of the receptor. It also states, the mitigation measures proposed would reduce this impact.

Increase in leisure boating

9.8 An increase in leisure boating would change the balance of the uses made of the harbour and reduce the relative emphasis on fishing thus affecting the character of the town. This may result in an impact at a *moderate adverse* level of significance.

Undeveloped land

9.9 The land it is proposed to win from the sea and part of the South Beach covers almost half of the area contained within the new breakwaters. For the purposes of the EIA and ES, it has been assumed that it would remain undeveloped for some time. An area of undeveloped land on this scale and at this location would cause a major change to the character of the South Beach, Princess Mary Parade, and the Spa Promenade, South Cliff Road and South Pier. The ES states, this impact would be at a *major adverse* level of significance. It would be a different type of impact if the topside development referred to above obtains planning consent and is built.

Civil engineering works

9.10 The ES claims that the new breakwaters and marina lock would be similar in cross-sectional dimensions, and therefore appearance, to the existing harbour structures. However, because they encompass more than four times the area of land and water than the existing harbour, they are necessarily on a far greater scale. The ES considers that their impact on the environment would be at a *moderate adverse* level of significance.

Maritime interest and improved facilities

9.11 The influx of boats into the new marina would create more direct visual interest. The economic 'trickle down' effect resulting from the marina users could help to revitalise areas of the town that are currently suffering from lack of investment, and provide more facilities. The scheme may provide the opportunity to upgrade the existing harbour and the Spa Promenade, if careful consideration were given to the design of the interface between the existing structures and the new developments. The success of such a potential change would depend on sensitive design, on the one hand, and, on the other, awareness that a shift in balance away from fishing and towards leisure boating could have a negative effect on the existing character of the town. The ES considers that the potential for visual improvement that may be brought about by future development of the topside would give rise in due course to an impact at a *moderate beneficial* level of significance.

Changes to views from locations of principal visual receptors

9.12 The visual receptors are described in Chapter 2, Paragraphs 2.60 to 2.62, and the visual impacts upon them are described in the following paragraphs. Visual impacts are concerned with the civil engineering works, including the breakwaters, marina lock and the platform of undeveloped reclaimed land and the marina basin, which collectively comprise the completed scheme as described in the Works Order. They do not take into account any future development that may take place on the platform of land. Therefore, it is claimed in the ES that they can be considered as short-term to the extent that they would be altered if and when the topside development, or a transitional scheme, on the platform of land are carried out. Proposed mitigation measures are described in Paragraphs 9.31, below.

South Beach

9.13 South Beach is a large beach of fine sand situated immediately to the south of the existing harbour. It is designated an EC bathing beach and is maintained in smooth clean condition on a daily basis using special machinery. A large section of the beach, an area of some 13 ha, would be lost if the scheme is developed. The Council argue that the remaining beach would maintain the same relationship with the new breakwater of the scheme as the present beach does with the existing harbour, although in a more southerly location. The new breakwater would be of a larger scale than the harbour piers although it would not be possible to see the platform of reclaimed land from the beach. The ES states, the impact of the scheme would be at a *moderate adverse* level of significance, and the mitigation measures proposed in Paragraph 9.2, above would reduce the impact during the construction phase only.

Princess Mary Promenade

9.14 Princess Mary Promenade is located approximately 2.0 m above South Beach. Its northern boundary is situated adjacent to the point where the new southern breakwater would meet the seashore, and it extends southward for about 0.5 km. It incorporates bathing facilities and is backed by a planted embankment, which extends up to South Marine Drive, which is situated about 6.0 m above at its southern end.

9.15 From this promenade, it would be possible to see both the new southern breakwater and the tops of the vessels within it. The appearance would be similar to that of the existing harbour, although much closer, and the platform of reclaimed land would be visible as a large expanse of undeveloped land. The ES considers that the impact of the scheme is likely to be at a *moderate adverse* level of significance.

The Spa Promenade

9.16 The Spa Promenade is situated between Princess Mary Promenade and South Cliff Road, adjacent to the sea front. It overlooks the South Beach and it is situated at approximately the same level as the breakwaters and the platform of reclaimed land. It includes the Spa Theatre and Royal Hall, as well as a small children's boating pool.

9.17 The platform of reclaimed land would run the whole length of the Spa Promenade and extend approximately 300 m to seaward. The marina, the extension to the South Pier and the eastern breakwater would be situated beyond the reclaimed land. The ES predicts that the impact of the scheme on the Spa Promenade would be at a *major adverse* level of significance.

South Marine Drive

9.18 South Marine Drive is located inland of, and adjacent to, Princess Mary Promenade and the Spa Promenade. It is elevated above the promenade level by approximately 3.0 m at the Spa Promenade and 6.0 m at the southern end of Princess Mary Promenade. The west side of the drive consists of two-storey and three-storey houses that overlook the beach and sea, mostly built in the early years of the 20th Century. Some of them offer bed and breakfast accommodation or have been converted to small hotels.

9.19 The new harbour would be visible from the majority of visual receptors along South Marine Drive until partially shielded by the Spa Theatre. The new breakwater would dominate the foreground with the platform of reclaimed land and marina beyond. It is stated in the ES, the effect of this change would amount to an impact for the majority of visual receptors along South Marine Drive at a *major adverse* level of significance.

Pembroke Terrace

9.20 Pembroke Terrace is situated to the north and east of the Spa and faces directly into the new harbour. It is elevated above the existing promenade by approximately 4.0 m. It consists

mainly of 19th Century terraced houses of three storeys, and some have fourth floor dormer windows.

9.21 The view from this terrace would be dominated by the scheme, with the platform of reclaimed land in the foreground and the marina beyond. To the south and east the breakwaters would be visible. This would represent a change in the scale of development in this locality. In terms of the scale, and assuming the viewer would perceive the development to be unsightly, the effect on visual receptors would, according to the ES, amount to an impact at a *major adverse* level of significance.

South Cliff Road

9.22 South Cliff Road overlooks the existing harbour and comprises mostly small cafés and restaurants along its western side; the Royal Yorkshire Yacht Club is also adjacent. The road is elevated above the existing harbour and has views across it to the sea beyond. From this road, the platform of reclaimed land would be visible beside the existing harbour with the marina and breakwater beyond. The ES states, the resulting impact would be at a *moderate adverse* level of significance.

Ebor House

9.23 Ebor House is a multi-storey block of flats situated to the north of South Cliff Road. It has extensive views over the existing harbour and to the sea beyond. The platform of reclaimed land would be visible to the south, from above in the cases of the upper floors, with the marina and breakwater beyond. The ES states, the impact would be at a *moderate adverse* level of significance.

South Pier

9.24 South Pier is the breakwater that forms the southern boundary of the existing harbour. It supports a building that houses fishing facilities at the eastern, that is seaward, end. The pier is constructed from masonry and is accessible to the public by means of a roadway on top. From the South Pier, the whole of the existing harbour is visible to the north, including the jetty, Harbour Road and the North Pier, and the open sea and South Beach to the south.

9.25 The new harbour would be to the south, with the platform of reclaimed land and the marina being in the foreground with the breakwater beyond. From this location the marina would, visually, represent an intensification of use, which would it is claimed result in more visual interest. However, this beneficial impact would be partially offset by the adverse visual effects of the reclaimed land. The ES states, the overall effect would amount to an impact at a *minor adverse* level of significance.

Bridge Street, Queen Street and Prince Street

9.26 These streets have properties that occupy an elevated position and whose rear elevations overlook the existing harbour to the south. Several of them are cafés with dining rooms that overlook the harbour.

9.27 The existing harbour dominates the foreground from this location, with the new marina visible beyond South Pier. Beyond the marina to the east the reclaimed land and the breakwater beyond would be visible. The ES indicates that the resulting effect would amount to an impact at a *minor beneficial* level of significance.

Harbour Road

9.28 Harbour Road runs along the north side of the existing harbour. To the north of the road there is a museum and a number of gift shops. From Harbour Road there are views across the existing harbour to the jetty and South Pier beyond. It is likely that the new harbour would be partially visible from the upper rooms but not from quayside level. The impact of the scheme is considered in the ES to be at a *negligible level* of significance.

North Pier

9.29 North Pier forms the eastern breakwater to the existing harbour. It is constructed from masonry and has access to the public by means of a road on top. From this pier, there are extensive views both to seaward and across the existing harbour to the west. The new harbour would be visible from the southern end of North Pier. However, the eastern impounding structure and the marina being beyond would dominate the foreground. The ES indicates that the impact would be at a *negligible* level of significance.

Seaward

9.30 From seaward the new breakwaters in the scheme would be visible as an extension to the existing harbour. The marina and reclaimed land would not be visible from the deck of the type of craft that would use the existing harbour or the new facilities in the scheme. The resulting visual effect of the scheme from seaward receptors would, according to the ES, amount to an impact at a *negligible* level of significance.

Proposed mitigation measures

9.31 The following mitigation measures are proposed to reduce the significance of the environmental effects described above.

(1) Construction of the marina should not be started until an approved scheme has been agreed for the topside development of the reclaimed land and a programme confirmed that ensures that work begins on that development within one year from completion of the works authorised by the Works Order, if approved. This would ensure that the reclaimed land does not become a brownfield site thereby incurring problems often associated with such sites, such as fly tipping. However, during the inquiries the Council withdrew this proposed mitigation measure (Paragraph 9.47, below).

(2) The materials used in the construction of the marina should be indigenous sandstone, like that of the existing harbour, to maintain continuity.

(3) The breakwaters should have rock revetments to their outer faces. This would reduce the hard outline and present a visually more natural appearance where the southern breakwater adjoins the beach.

(4) Lighting to the marina should be carefully designed to ensure a low level of light pollution. The use of bollard lighting and low pollution luminaries should be considered and high mast lighting disallowed.

9.32 The ES states, implementation of the mitigation measures indicated in Paragraph 9.31, above should ensure that any major adverse effects of changes to landscape character and visual impact brought about by the scheme are reduced to a *moderate adverse* level of significance.

The impact of the infrastructure and topside development proposed for the platform of reclaimed land in the scheme

9.33 The ultimate visual impact during the operation of the scheme would be specifically associated with the future development of the platform of reclaimed land. The ES states, it would be extremely challenging to place a development of the magnitude envisaged in the Development Framework for the topside, prepared by the Council, into the existing Bridlington townscape without causing a significant adverse landscape impact on both the adjacent environment and the rest of the town. The existing harbour is of small scale and has developed over many years in a pleasantly piecemeal manner, including many architectural styles. The framework is described in Appendix 1 to Document APP/AP28 and Documents APP/110, APP/111 and ERYC 29.

9.34 The topside development may include small-scale buildings, but the ES indicates that its total mass would be considerable in relation to the buildings surrounding the existing harbour, and any attempt to replicate the existing townscape or buildings would lead inevitably to a contrived appearance. There is also a possibility that the topside would affect areas away from the harbour.

The ES recognises that one of the aims of the project is to ensure that both the marina and the topside should have a beneficial effect on the regeneration of Bridlington as a whole, including its landscape. The extent to which this is achieved would depend largely on the type and scale of development that would take place and the proposals for the topside would need careful consideration and landscape design. The landscape assessment (Appendix 9 of Document ERYC 2) refers to another project of similar size and nature, the Brighton Marina. That project is still not complete after some 30 years having suffered many setbacks during that time. The nature of the current development there is very different from the original scheme although the effect on Brighton has been negligible as the marina is some 1.5 km from the centre of that town, and the town itself is much larger than Bridlington and its character is also less fragile.

The cases of the parties

The Council

9.35 Ms Sian John, in her evidence as expert witness on behalf of the Council (Document APP/P20), refers to the findings reported in the ES. The other principal witness is Mr Philip Parker, who holds the degree of BSc and post-graduate diplomas in town planning and in urban policy and processes. He is a member of the Royal Town Planning Institute and is the Head of the Council's Planning and Environmental Services (Documents APP/P26 and APP/AP28).

9.36 Ms John says that Bridlington retains much of the character of a traditional seaside town and is a tourist destination among others on the east coast of England. She considers that the impacts of the proposed scheme on landscape and views identified in the ES are localised and unlikely to have any significance beyond Bridlington itself. Readjustment of the beach line caused by the loss of part of the South Beach under the footprint of the works together with the consequential landscape change that is predicted represent the only moderate to major adverse impacts identified in the EIA.

9.37 Ms John indicates that the impacts on landscape and views can be sub-divided into four types - (1) the presence of the civil engineering works, a short-term impact described in Paragraphs 9.1 to 9.3, above, (2) changes to the landscape character during construction and after the scheme has been completed, (3) changes to views from various receptors, and (4) visual obstruction of parts of the existing harbour piers. The impacts would be necessarily of short-term nature because they do not take account of any topside development in the future. However, she does refer to the Development Framework for the topside contained in the evidence of the Council's Head of Planning and Environmental Services, Mr Philip Parker and the supplementary planning guidance reported in Document ERYC 29 (see Paragraphs 9.43 to 9.47, below). She says that the ES indicates how the topside could in due course mitigate against the impact of the scheme on landscape character and the views.

9.38 The potential impacts arising from the construction site are visual and involve two elements of the civil engineering works. The first is the construction of breakwaters and a lock, which would involve transport barges and hydraulic grabs. This impact is considered to be of a minor to moderate adverse level.

9.39 The second source of visual impact would arise from a dredger, pipeline and earthmoving machinery used to create the platform of land for the topside development over the South Beach and in the sea next to the South Pier of the harbour. It is also claimed that it would be at a moderate adverse level and short-term in duration; and that such construction works provide interest for local people and tourists, and would be an impact of minor beneficial significance. Mitigation proposals reported in Paragraphs 9.2, above would be required.

9.40 Regarding the completed marina scheme, Ms John agrees with Mr Parker that the development would constitute an extension to the existing harbour and not alter the character of what is already a working harbour for both commercial and leisure craft. However, she agrees with the ES that the scale of the scheme is considerable, as the area encompassed by the new breakwaters, including water and land, is, she says, some three times the size of the existing harbour. (The area

concerned is in fact over four times the size of that of the existing harbour according to the plans and drawings submitted with the Order). She confirms that the impact of the scheme is therefore likely to be at a major adverse level of significance, as described in the ES.

9.41 The platform of land for the topside development covers almost one half of the area contained within the breakwaters. For the purposes of the ES it is assumed that it would remain undeveloped for a period of time. An area of undeveloped land of this scale and at this location would alter the character of the South Beach, Princess Mary Parade, the Spa Promenade, South Cliff Road and the South Pier of the harbour. Ms John agrees with the findings of the EIA that the impact would be at a major adverse level of significance.

9.42 Ms John refers to South Beach as a large area immediately to the south of the existing harbour; it is described in Chapter 2, Paragraphs 2.57 and elsewhere. She acknowledges that it is a EU designated bathing beach, made of fine sand that is maintained in a smooth condition on a daily basis using special machinery. Although a section of this beach would be lost because of the works she argues that the remaining beach would maintain the same relationship with the new breakwater as it does with the existing harbour, although in a more southerly location. The breakwater, which would then effectively replace the South Pier as the northern boundary of the beach, is a large-scale rock structure and the platform of reclaimed land could not be seen from the beach. The visual impact upon users of the South Beach would be of a moderate adverse level of significance, but she claims that the mitigation measures proposed would contribute to reducing the impact. The impact on each of 12 receptors indicated in the ES is summarised, and reported in Paragraphs 9.12 to 9.30, above. The levels of significance of the impact would be major adverse in five cases, moderate adverse in two, minor adverse in one, minor beneficial in one, and negligible in three.

9.43 Ms John maintains that the significance of the visual impacts on the landscape would be reduced by sensitive design of the topside development. Other mitigation proposals include preparing an appropriate landscape plan and the use of construction materials that are consistent with those of the existing harbour, as described in Paragraph 9.31, above. The Council do not provide details to enable an assessment to be made of the environmental benefits associated with these ideas.

9.44 In response to objectors Ms John refers to an initial landscape visual impact appraisal of the Council's indicative proposals for the topside works. On the basis of the indicative plan they have produced, she considers the impacts on 12 receptors, and describes them in Document APP/P20. The indicative proposals do not contain details of building heights, but do assume that buildings, particularly those in the foreground, would be low rise and of good design. She assesses that in seven of the receptors (Princess Mary Parade, the Spa, South Marine Drive, Pembroke Terrace, Ebor House and South Pier) the extent of the impact would be beneficial, in four cases (South Cliff Road, Harbour Road, North Pier and Seaward) the extent of the impact would be negligible, and in only one receptor, South Sands, would the extent of the impact be adverse. She uses the same definitions of impact as those described in Chapter 2, Paragraph 3.2 of this report.

9.45 Mr Parker, in his evidence, reviews national, regional and local policies and their relevance to the proposed marina scheme. Aspects relating to the environment are reported below. He quotes from PPG20 (1992) on coastal planning, which states, policies prepared by local authorities should aim to balance development requirements with the need for conservation and enhancement of the coastal environment. He refers to RPG12 (1996), which identifies much of the region's coastline as being undeveloped and of environmental value. It states that proposals likely to strengthen the economic viability of coastal settlements or to regenerate coastal resorts will be acceptable provided they are well located in relation to existing built up areas and will not unduly affect the local environment. Current revisions to the RPG12 (Document ERYC 39a) include a policy statement that refers to the need for a sustainable and environmentally responsible approach to the region's coastline, with emphasis on an integrated approach to the protection of coasts and estuaries.

9.46 In the context of these policies Mr Parker considers that the scheme is clearly an extension of the centre of Bridlington, and that it has no unacceptable impact on the landscape or nature conservation interests. He continues by insisting that the economic regeneration aspects weigh

heavily in the scheme's favour. Moreover, the project would not have an adverse impact on the local environment providing that the overall master plan for the development area creates a high quality development. He introduces the Development Framework prepared and approved by the Council to deal with general planning considerations affecting the scheme (Appendix 1 to Document APP/AP28, and Documents APP/110, APP/111 and ERYC 29). The Council consider that, in addition to the analysis already undertaken as part of the EIA, the additional information in that framework for land-based development should illustrate how the impacts involved can be mitigated to achieve a high quality of development.

9.47 Mr Parker says that the Council recognise that, given the size and complexity of the scheme, it is possible that the land-based development package might not take place immediately following the construction of the marina and completion of the land reclamation, or it may take place in an incremental fashion. There is a need to have contingency arrangements in place to meet this possibility. Therefore, the Council would intend to adopt a range of interim development/leisure/tourism initiatives to ensure that the reclaimed land is used for the benefit of the town and the local economy throughout the life of the proposed scheme. He provides an outline of these transitional contingency proposals, but no details of significance, in Appendix 1 of Document APP/P28. The mitigation strategy, referred to in Paragraph 9.31, Sub-paragraph (1), above does not apply any longer. It has been varied by the Council, and in effect reduced, to countenance the possibility of delay in the carrying out of the topside works (Document APP/264).

The Commissioners

9.48 Witnesses on behalf of the Commissioners consider that the visual effect of the scheme would be detrimental. There would be a significant impact on the character of the harbour, the adjacent environment and the townscape, as well as great upset to residents during the construction phase. They are also concerned about the loss of part of the South Beach, which would result in Bridlington ceasing to attract families to the beach; and about loss of facilities for recreational fishing and damage to the listed South Pier.

9.49 Mr Gilbert Gray QC, Counsel for the Commissioners, submits it is universally agreed that there are two jewels in the crown of Bridlington, each of which adds lustre to the other: they are the listed harbour and the award winning South Beach. If the Council's proposals are confirmed both will be despoiled by what he considers would be a land grab. A nasty new town will be built on an old much-loved beach (Document OBJ/222). Mr James, the Commissioners' expert witness on planning matters, elaborates on the visual impacts of the works on the existing harbour and adjoining sea front (Documents OBJ/P21 and OBJ/AP23). He maintains that a smaller scale development would require less land and have less impact generally, and the southern and eastern breakwaters could be reduced in size so that visual impact, as well as traffic and vibration, would be less.

9.50 He refers to the planning policies discussed by Mr Philip Parker, which are among those examined by the Commissioners and included in Document BPHC 8. It is clear from several of these, and from the Structure Plan, that any tourism development along the sea front should reflect the character of the surrounding uses. He argues that the character of the existing harbour and its piers form the focus of the town. The townscape is small in scale, comprising mostly two or three storey buildings constructed from local materials and arranged around an *ad hoc* street pattern. The Commissioners consider that the town and the harbour area have an inherent quality that is worth preserving.

9.51 Regarding the scale of the scheme and its effect on the character of the harbour area and the town centre, Mr James refers to the fact that the new harbour would constitute an area of water three times that of the existing harbour as well as an area of reclaimed land of a similar size to the existing town centre. There would inevitably be a significant impact upon the character of the harbour area, the adjacent environment and the wider townscape. The Council recognise this fact and state that the topside development will need to be the subject of an EIA. Mr James considers it will be extremely challenging to develop the topside works and to integrate them into the existing Bridlington townscape without creating a significantly adverse impact upon the harbour area and the rest of the

town. The proposals are therefore contrary to several policies referred to both in his evidence and that provided by Mr Parker, notably policies T1, E10, En18 of the Structure Plan and policies Brid 15 and Brid 16 of the Local Plan.

9.52 Mr James indicates that the topside works have not yet been designed, and it is impossible to ascertain whether or not the scale of what may be envisaged is reasonable, particularly the amount of land to be reclaimed for that purpose as part of the proposed marina scheme. During the inquiries it is suggested by the Council that the extent of the topside works be reduced from that originally envisaged in the EIA and ES. However, no corresponding reduction is made in the extent of the reclaimed land or of the area involved in the other parts of the proposed marina scheme.

Responses to the Commissioners' evidence by the Council

9.53 The Council argue that works that are the subject of the orders would not result in the loss of views from the promenade or the properties beyond it (Documents APP/RP53 and APP/RP55). The final scheme, including the topside development, would clearly represent a significant environmental change locally, but they maintain that the landscape character constituting the harbour and marina facilities and enclosed water would not be altered. The Council's commitment to establish a Development Framework and to follow a master planning approach for the topside intends to limit the heights of the buildings in that development so as not to obstruct the sea views, particularly from Pembroke Terrace and South Marine Drive, and views of the Spa.

9.54 Ms John summarises an initial landscape appraisal of the proposed plan for the area including the topside development (Document APP/P20), referring to views from 12 places including those from the South Beach and the streets behind and the harbour (Paragraph 9.44, above). They indicate the extent of visual impact as ranging from minor adverse in one case (South Beach), minor beneficial in six cases, moderate beneficial in another case, and negligible for the remaining four. The Council consider that a detailed landscape assessment needs to be undertaken when the final design, or design options, for the topside development are determined.

9.55 Regarding the upset to residents the Council agree that some local disruption would occur but limited by the requirements placed on the contractor to maintain a tidy site, as described in the paragraphs dealing with mitigation measures in the ES, which would involve supervision by the Environmental Health Officer of the Council (Paragraph 9.2, above and Chapter 7, Paragraph 7.13).

9.56 Ms John admits it is clear that the scheme would result in removal of part of the beach. The area to be lost below mean high water to the footprint of the works is characterised largely by fine material rather than beach sand. For these reasons it is argued that the beach area referred to is not heavily used, with visitors predominantly gravitating towards the area south of the proposed works. Most of the beach facilities provided for the South Beach are located further south than the site of the proposed works. With the works in place the area people use now near the harbour would have simply moved southwards. Due to the expanse of beach in the vicinity of Bridlington, the extent of the available resource is not limited and the users are mobile. The same argument is reported in Chapter 7, Paragraph 7.61 and Paragraphs 7.77 to 7.79, as it is applies to impacts on human beings. Impacts of the scheme on the use of South Beach by the public and on landscape character and views in that area are intricately related.

9.57 Mr Parker responds particularly to the observations expressed by Mr James on behalf of the Commissioners. He agrees with Mr James that the scheme is clearly of significant size compared with the existing harbour, but asserts that the physical relationship between them is such that the new works would not dominate the existing environment. He considers this is in part achieved by the large expanse of enclosed water in the marina basin and by the requirements of the Development Framework to reduce the visual impact of the proposed topside works.

9.58 The visual impact of the topside development would be influenced by careful disposition of the various land uses, avoidance of high-rise development and a commitment to high standards of architecture and urban design. In the Council's view the quality of that topside

would respect and enhance the character of the harbour and adjoining town centre and it is therefore not contrary, as claimed by the objector, to Local Plan or Structure Plan policies. Moreover, he says proposals would not affect the listed buildings. Mr Parker insists that the Council's proposed scheme would not have an adverse impact on the character and appearance of the harbour and surrounding area. He also insists that their proposals are therefore not contrary to policies E10, En18 and En 20 of the Structure Plan or policies Brid 15 or Brid 16 of the Local Plan as claimed by the Commissioners.

9.59 In response to Mr James's claim that a smaller scheme would create less impact on the environment, the Council say they have examined that option. They consider there is no evidence that the visual impact would be significantly reduced by a smaller scheme, and they refer to Document APP/61. Moreover, the Commissioners do not draw attention to the short-term nature of the visual impact or to the fact that it would be modified in any case by the eventual topside development. They submit that in the development of the proposals before the inquiries there is now a clear view as to what would happen to the reclaimed land and how it would be treated should the topside development be delayed for any reason.

Other objectors

9.60 Mr A J Thompson and Mr C Oliver object to the impacts on landscape and views (Documents OBJ/P41 and OBJ/P32) and on the amenities of the South Beach.

9.61 Mr Thompson considers that the award-winning beach at Bridlington is the best asset of the town and many hundreds of people feel it is sacrilege to even consider building on it. The scheme indicates an irreversible development that would take away the right of the public to this amenity. Visitors to the town from many parts of the country enjoy this facility and are not likely to move down the beach because the area affected by the proposed works, which they use now, is close to the town centre and where they stay.

9.62 Mr Thompson objects particularly to the impression given by the Council in Document APP/152 relating to the extent of beach in Bridlington for the following reasons.

(1) The document is irrelevant in the context of the area of beach to be covered by the scheme.

(2) The inclusion of the North Beach in the document is also irrelevant.

(3) The stretch of the South Beach as indicated in the document appears to include a section of Wilsthorpe's beach, which is not part of Bridlington's beach.

9.63 Document APP/152 gives the public a view, sometimes voiced in the press, that the loss would only be a length of 200 m, or 7.0 per cent of the total of beach in Bridlington. On the basis of the data in that document, the scheme would, in fact, take up 530 m out of a length of 1600 m of the South Beach, a total of some 33 per cent.

9.64 Loss of the beach is also Mr Oliver's principal concern as he regards the South Beach as a very important amenity. He defines it as being any area from the promenade wall to the sea whatever height the tide is at the time, and including that portion of the sea where paddling is enjoyed. Definitions of wet sand, foreshore and dry sand can be ignored individually; his definition of the beach is inclusive, and he supports his statements with a collection of 19 photographs taken from various viewpoints in July and August 2000.

9.65 Mr Oliver refers to answers given in a survey in the 1980s when holidaymakers overwhelmingly declared that what they like most about Bridlington is the beach. It was much the same story 100 years earlier when John Brown wrote about the area, "....The merry pleasant Sands. Such beautiful sands as we have are not to be found at any other watering place". After considerable research the objector states he cannot find another location where a marina and development have been proposed for a popular beach location and does not want Bridlington to set a precedent. Another objector, Mr C Seymour, remarks that an alien looking down from above would think that we are all

mad ever to contemplate destroying the seashore, which is one of our priceless assets (Document OBJ/29).

9.66 Mr Oliver is particularly concerned that it is the town end of the South Beach that would be obliterated, which is a very popular section even though it contains the part near the South Pier not usually associated with building sand pies and sand castles. The area to the south of the lifeboat slipway is also popular but is usually narrower than that near the South Pier. Then there is mile upon mile of beach available further south, but that is not in Bridlington. He challenges the accuracy of a letter supporting the scheme submitted to the inquiries from the Bridlington Hotel and Guest House Association, dated 5 February 2001, which states, "the area concerned is of a very rocky nature, and is in any event covered completely by the tide for most of the time". He provided photographs to prove that the statement is untrue.

9.67 The beach nearest to the South Pier is wet for the longest period and by its very nature is covered by the sea before other areas, but in no way can it be described as covered most of the time. Neither is it barren, as indicated in the Council's evidence. Moreover, it is inappropriate for the Council in oral evidence to the inquiries to refer to this beach as a 'brownfield site'. It is a phrase used for a previously developed site to meet perceived shortfalls in the Government's targets for housing development. There is no such thing as a brownfield site on this seashore.

9.68 Activities on the beach are not confined to building sand castles and sunbathing. Rock pools and wet areas provide a variety of opportunities as the tide recedes to give pleasure to many people. His photographs show the use and popularity of the beach area that would be covered by the scheme. Regarding Ms John's response to his objection, which says that the beach users and the facilities are mobile, he fears the mobility would be extended to include leaving Bridlington well alone. Getting to the beach to the south of the proposed development would take much longer from both the coach park in the town and the railway station. Day visitors would not bother, and go to another resort for preference.

9.69 Mr Oliver's collection of photographs of South Beach and adjoining areas contains descriptions of various sections of the shoreline. They include 15 photographs of the area that would be covered by the marina (72,000 m²) and the associated development on the South Beach (137,000 m²), taken over a period of weeks in the summer of 2000. They show South Beach at various states of the tide and prove that the view, promoted by the supporters of the scheme, that the beach is covered by water most of the time is quite wrong. There are also two photographs taken along the line of the new southern breakwater in the scheme and another two showing a longer aspect of the beach.

9.70 Mr K Ambler, in addition to his concerns about bait collecting and fishing on the beach to the south of the harbour, reported in Chapter 7, Paragraph 7.65, refers to the birds that use this area of the South Beach and submits a list of 10 species of waders and 15 species of gulls and terns, and eight photographs (Document OBJ/P43). He objects to the loss of biodiversity in this beach area that would occur if the scheme goes ahead.

9.71 An objection by the Bridlington Protection Group that takes account of the views held by Mr Thompson and Mr Oliver, both of whom are members of that Group, is reported in Documents OBJ/P34 and OBJ/170. Almost all the 294 written objections, and 21 objections under Rule 9(8) received by the Council, reported with rebuttals in Document APP/254, complain about the loss of beach that would result from implementing the scheme.

Responses to the evidence of other objectors by the Council

9.72 In response to Mr Thompson regarding the amount of beach involved in the scheme the Council agree it is common ground that some 530 m length below high water mark but which normally dries out sufficiently for use between tides would be lost. The area that would be covered by the scheme is largely below mean high water and frequently wet (Document APP/264).

9.73 The Council submit that the South Beach extends to the footpath from the Belvedere car park rather than to Pitt's Wall promenade, as that would make more sense, but admit the definition is a

matter for the decision maker to resolve. They calculate that if one takes the loss between high and low tides in terms of the length of beach, it is either 27 per cent or 33 per cent depending on which definition of the South Beach is taken. The length as a corresponding percentage of the total beaches in Bridlington is 6.8 per cent or 7.6 per cent, again depending on which definition is taken (Document APP/152). However the loss is defined, the Council consider that it is a significant stretch but argue that it is a minor stretch of the beach resource available to Bridlington as a whole.

9.74 The Council submit that inevitably with a project on this scale there would be disadvantages as well as advantages. Loss of a length of beach is one such disadvantage but it has to be put into perspective. There is still plenty of beach left and available for use, that is some 264,000 m² on the South Beach alone and using Mr Thompson's figures. The residual beach is of good quality and although slightly further from the town now, with the development proposed the town would extend further south and the distances to the edge of it would be comparable to what they are now. The loss has to be offset against the benefits set out earlier.

9.75 The Council's response to Mr Oliver follows the same line of argument. They point out that he had accepted (1) that the area that was being taken was that closest to the town and thus with the greatest potential for linkages with the town, and (2) that it was the wettest part of the beach.

9.76 The Council note that Mr Ambler claims that his main objection was environmental. They submit that he would find worms for use as fishing bait by moving along the South Beach and they suggest he would consider using the new Canch when it was exposed.

9.77 The Council's responses to written objections admit that there would be some loss of beach to facilitate the proposed development. They submit that this loss must be viewed against the actual amenity and tourism value of this area, and that regard must be given to the fact that, apart from a small section, the beach involved is not available for continuous use because of tides covering it twice a day. They submit further that this area is not part of the main tourist beach and remains wet longer than other parts as the tide ebbs.

9.78 The Council submit that loss of beach needs to be balanced against the benefits of the project in securing the socio-economic regeneration of Bridlington. The tourism impact arising from the loss of beach would be minimal, an opinion based on their considerable knowledge of beach usage in the area. In addition, the Council assert there is a very extensive beach further south and it is their intention to extend the "Tidy Britain Group Beach" to the south to attract tourism to that part of the beach.

Findings

Two categories of impacts

9.79 The evidence shows that the effects on the landscape and the views in the Bridlington area arising from the proposed scheme as described in the Works Order can be classified into two categories of impacts. First to appear would be the construction phase impacts, when structures are being built, such as engineering equipment and materials. They would become felt over a period of time, possibly as long as 10 years according to the Council's estimate if account is taken of the topside works if that development were to go ahead. They would cause an upset according to the objectors. The ES does not deny that fact, although it does provide some mitigation measures. Whatever their severity and length of time over which they would occur, the construction phase impacts need to be viewed as the precursors to the impacts of permanent structures of one kind or another.

9.80 The second category of impacts contains those that would arise from a completed scheme as described in the Order but including modifications agreed at the inquiries. The principal sources of impact would be the platform of land for the topside development, the breakwaters and the marina basin. Particular attention is given in the ES and the evidence of the objectors to these impacts as they obliterate some 13 ha of prime beach and the vertical seaward side of the South Pier up to within a

few metres of the top of that wall, and an additional 7.0 ha of the sub-tidal near-shore area would also disappear under the works.

Involvement of the proposed topside development as a factor in the assessment of these two impacts by the Council

9.81 In the ES, the assessments of these two categories of impacts are reported. However, the Council attempt to deal with the uses and development proposed for the platform of land for the topside in the future by relying on information in their Development Framework (Document ERYC 29). The Council's Head of Planning and Environment, Mr Philip Parker, bases their case firmly on the impact on landscape and views of the final product, that is, the completed topside development. The Council are seeking to persuade the inquiries that the topside development, in due time assuming it obtains planning permission, would mitigate the impacts of the scheme in the Works Order. But that topside has yet to be designed and promulgated. I consider that their approach is outside the scope of the ES and is dubious in other respects as a contribution to the inquiries. It is certainly a major distraction in that the inquiries, in environmental terms, have to concentrate on the impacts of the scheme in the Works Order and not any other proposals that may be put forward for planning permission in the future, as indicated by their Counsel in response to questions by Mr James on behalf of the Commissioners (Chapter 3, Paragraph 3.11).

9.82 The legal aspects of the scope of an EIA are discussed in Chapter 3, Paragraphs 3.17 and 3.18. I have agreed with the view expressed by Counsel on behalf of the Council in her submission at the inquiries as to what could legally be expected from them and their environmental assessors. The substance of that submission is supported by recent judgements in the Courts (Paragraph 3.18). I consider that her view must also apply to the question of the acceptability of the Council presenting at the inquiries a subjective impact assessment of proposals for the topside development that have not yet even been formulated as part of a planning application and formal EIA and ES. She objects to the expectations of Mr James, on behalf of the Commissioners, that the Works Order should have been accompanied by a full EIA covering the topside development. I support her in that objection. I do not therefore consider that the Council themselves are in a position to use incomplete data based on their indicative Development Framework as a relevant contribution to the assessment of the effects of the marina scheme in the Works Order having asked the inquiries to disregard the requests of the Commissioners for an environmental statement covering the proposals for a topside development. What is sauce for the goose is sauce for the gander.

9.83 Even if the Council's approach were to be legally acceptable, the information that is available for considering the influence of the indicative topside development is only predictive and speculative, and therefore both inadequate and unreliable. It cannot be used objectively as a basis for influencing the judgment of assessors in the EIA regarding the scheme in the Works Order, a formal process that does not take into account matters that are outside the terms of the Order and the scoping exercise agreed at the outset (Document ERYC 2, Pages 12 to 14). A reliable EIA is dependent on rigorous survey and assessment of the environment to be affected by a proposed development followed by an equally rigorous assessment of the likely impacts on that environment of the components of the development. These basic requirements are not met when the Council's witnesses adopt the rudimentary proposals for the topside development as a basis for trespassing on to the ES for the scheme in front of the inquiries. For example, attempts are made to use concepts in the Development Framework and speculation about the components of the topside, which are indicative and very rudimentary, as a basis for mitigation proposals. It is certainly unacceptable for the Council to use this information as a factual basis for claiming that the topside would reduce the predicted severity of the assessed impacts of the scheme as described in the Works Order. I find this approach untenable, and a distraction. The inquiries are concerned with the environmental impacts arising from the scheme in the Works Order, if it is approved, and not with any others.

The principal impacts arising from the proposed scheme in the Order

9.84 The evidence produced regarding the scheme in the Works Order identifies the following impacts.

(1) There would be visual intrusion of materials and engineering equipment used in building the structures. These impacts would be of a short-term duration, the works culminating in the permanent features comprising breakwaters, marina basin and platform of reclaimed land.

(2) The completed scheme would result in a major alteration in the character of the landscape because of its scale in relation to the size of Bridlington Harbour and the central area of the town around it.

(3) The scheme would obliterate an area of 13 ha of the South Beach situated next to the harbour and the town centre including the inter-tidal habitats for wildlife and their contribution to the visual quality of the area, as well as 7.0 ha of adjacent seascape and sub-tidal habitats.

(4) The scheme would also obliterate most of the seaward face of the South Pier of the harbour because it is needed to serve as one of the retaining walls for the platform of land built on the beach and in the sea below as a foundation for the proposed topside development.

(5) The scheme would have an impact on views from the streets and buildings along the seashore, the harbour and the southern and western parts of the town centre.

(6) The scheme would also have an impact on views from the seashore, especially the remainder of the South Beach, and from the roads on top of the harbour piers seaward and southward along the South Beach and the sea front.

The validity of the EIA with respect to assessing the impacts of the works on landscape character and views

9.85 Sophisticated analytical methods were not used to assess landscape and views in the EIA. The assessment of impacts was carried out following a site visit lasting two days during which observations were made and photographs taken. The assessment methodology is described in Appendix 9 of Document ERYC 2. The results of the assessment are, in my opinion, reliable. The ES reports that the scheme would have impacts at a major adverse level of significance on landscape and views. I concur with that conclusion. No environmental assessor could be expected to reach a different conclusion because of the sheer magnitude and severity of the impacts.

The scale of the scheme as a dominating influence on the existing harbour and the townscape

9.86 The objectors produce a considerable amount of information that supplements or challenges the contents of the ES or the Council's assertions. Mr James, on behalf of the Commissioners, elaborates on visual impacts saying less land would mean less impact (Document OBJ/P21). He emphasises that the town and harbour have an inherent quality worth preserving and feels strongly that the scale of the proposed scheme would be damaging to the character of the harbour area. He also considers it would be extremely challenging to develop the topside works and to integrate them into the existing Bridlington townscape without creating a significantly adverse impact upon the harbour area and the rest of the town. This mirrors the contents of the ES, reported in Paragraphs 9.33 and 9.34, above. Significantly, the ES refers to the difficulties experienced at Brighton, apparently the only other town in the United Kingdom where a marina is built on a beach, and it cautions Bridlington regarding the pitfalls. It appears that the impact of its scale is the negative aspect of the Brighton scheme even though the development is situated some 1.5 km from a large town. I consider that point is relevant to the objection by Mr James. He also draws attention to the reduction by the Council at the inquiries in the scale of the topside proposals, but there had been no corresponding reduction proposed to the extent of the reclaimed land in the marina scheme.

9.87 The Council do not agree, but I find their argument that reducing the scale of the reclamation scheme would not reduce the impact on the environment unconvincing. Moreover, in his response Mr Parker, on behalf of the Council, says that the physical relationship between the scheme and the existing harbour is such that the new works would not dominate the existing environment. This is in part, he argues, achieved by the large expanse of enclosed water within the marina and by the

requirements of the Council's Development Framework to reduce the visual impact of the proposed topside works.

9.88 Mr Parker produces no evidence to support his view that the physical relationships he refers to would result in the scheme not dominating the environment. I do not accept his opinion about the role of the Development Framework, as it has not yet become the subject of an appropriate assessment. He claims that the topside development would not include high-rise buildings, and that it would be well designed. However, these intentions could not reduce the scale of the scheme described in the Works Order or the severity of its impact on the landscape and views. In fact, the topside would obviously cause further deterioration environmentally in those respects, as views of the sea, harbour and wider landscape now available would be obstructed to an even greater extent if the platform of reclaimed land were to be built upon. A visual impression produced as evidence in another context by Mr Parker, shown in Plate 5 in Appendix 10 of Document APP/AP28, demonstrates that point clearly by showing how a building situated nearby on the platform of the topside development would completely obscure the view of the sea and South Beach looking south and east from the top of the South Pier. What Mr Parker is saying is that the topside development would, in the Council's opinion, be visually more attractive than the platform of reclaimed land. He is not addressing the impact on the environment of that platform and the other structures that form part of the scheme in the Works Order. Therefore, his opinions on these matters, which are in any case subjective, should not be accepted as a contribution to the environmental assessment of the scheme in the Works Order before the inquiries. The fact remains that the ES and the objectors consider these effects on the landscape and views to be an impact at a major adverse level of significance. I agree with the findings of the ES and the opinions of the objectors in that respect.

The environmental significance of national, regional and local planning policies

9.89 Mr James maintains that the Council's proposals for Bridlington are contrary to several policies including those quoted by Mr Parker in his evidence. I consider the opinion of Mr James, who is a qualified and experienced planner, is well reasoned regarding the compatibility of the proposed scheme in the Works Order with the planning policies he refers to. There is some room for argument with Mr Parker's interpretation of the same policies. For example, I have indicated in Chapter 6, Paragraph 6.52, I do not consider that the Council are paying respect to the criteria for sustainable development enunciated in RPG 12 in so far as obliteration of part of the South Beach and the South Pier wall at Bridlington is concerned. The ES says the impact on landscape and views would be at a major adverse level of significance, the most serious of seven classes used in the assessment process. This accords with the view held by Mr James, although Mr Parker disagrees. If sustained as an opinion then it obliges the decision maker to consider disallowing the proposed scheme in the Works Order because it is incompatible with several environmental planning policies as they apply to Bridlington.

9.90 Mr Parker, in various documents and orally, insists that the proposed marina scheme has no unacceptable impact on the landscape. His insistence is in direct contradiction to the conclusions of the EIA, as reported in the ES, that the impact of the scheme would be at a major adverse level of significance in terms of landscape and views. Mr Parker does not provide evidence to support his contrary assertion. The ES does substantiate its conclusions. Mr Parker seems to hold these opinions on the basis of his appraisal of the scheme in the context of various planning policy statements that he has reviewed. I cannot reconcile his opinions with my interpretation of some of those policies, especially with regard to the environmental impact of the scale of the works and the principles of sustainable development. It is impossible to reconcile his opinions, on behalf of the Council, with those expressed in the ES, a document also submitted as evidence on behalf of the Council. This dichotomy is unacceptable and is a flaw that goes to the heart of the Council's case regarding the environmental impacts on landscape and views that would arise if the proposed marina scheme were to proceed.

The landscape of the South Beach

9.91 Some of the objectors provide evidence that is factually helpful by contributing information to supplement the contents of the ES. For example, the folio of photographs submitted by Mr Oliver is illuminating, particularly with respect to the uses made of the South Beach by the public (Paragraphs 9.68 and 9.69, above). Mr Thompson provides an analysis of the extent of the South Beach that is affected by the scheme, evidence that dispels ambiguity in the Council's statement on that matter; and Mr Ambler submits information about wildlife and bait digging. These objectors consider the loss of beach as unacceptable. There is justification in their disapproval of the Council's assertions that it is not a very much-used section of beach that is involved, because it is often wet. It is true that the section nearest to the South Pier is affected by water flowing from nearby springs and is covered by the incoming tide sooner than sections further to the south. However, that situation has to be seen as part of the reason why this wet beach is the most interesting as a habitat for wildlife and is visited by members of the public who enjoy those features at close quarters rather than those who like to build sand castles. I find Mr Oliver's definition of the beach (Paragraph 9.64, above) accurately describes this natural resource. The Council's evidence regarding the description of South Beach contains contradictions.

9.92 The exact proportion of beach that would be obliterated by the scheme in the reclamation and other works is in dispute between the Council and objectors. I do not consider their differences on this matter of fact are of great significance. It is clear that the area concerned is that section nearest the South Pier, and its extent is obvious in the plans submitted by the Council (Documents ERYC 2, ERYC 3 and ERYC 4). However, I do not favour the Council's argument that the loss of this section of beach is not of great significance because they consider there is plenty more of the same further south. This is a remarkable attitude for them to adopt towards a beach area of prime importance in the middle of a traditional seaside resort that has hitherto suffered no physical invasion or pollution of its natural marine environment, certainly not since the 1840s when the harbour piers were built. Moreover, they have not provided convincing evidence that moving the usable beach further to the south is a practicable solution or that it is likely to be acceptable to the public. I also note that a substantial number of people who sent in written representations deal particularly with this point, as well as the anglers who would miss the fishing and bait collecting facilities on this beach.

9.93 In the case of the anglers, they would have to travel a distance of several hundred metres along or around the breakwaters if they are to accept the Council's suggestion that they would consider using the new Canch sand bar for bait collecting purposes when it was exposed (Document APP/264). There is no certainty that if the works were built that the new Canch would even be formed, let alone exposed, at any time in the future according to an agreed statement by the scientists, including the Council's own marine consultant (Chapter 4, Paragraphs 4.64 and 4.65). The Council's suggestion should not be considered as offering a realistic mitigation measure of benefit to the anglers.

Pubic use of the South Beach

9.94 The Council assert that the tourism impact arising from the loss of beach would be minimal, based on what they claim is their considerable knowledge of beach usage in the area. However, they do not provide evidence based on such knowledge to support their assertion. The objectors strongly disagree with their assertion.

Overall impact of the works on the landscape character and views associated with the area of the South Beach and south wall of the South Pier as a natural resource and public amenity

9.95 Having taken into account all the evidence and submissions about the loss of the beach and the south wall of the South Pier I do not sympathise, from an environmental standpoint, with the Council's case for obliterating the natural and historic heritage in this central part of Bridlington. The Council's proposals, if implemented, would amount to environmental impacts at a major adverse level of significance. There are no mitigation proposals that could be applied that would significantly reduce the severity of these impacts. These major adverse impacts are, in my opinion, so serious as to be totally unacceptable on environmental grounds.

Part 5

Chapter 10: conclusions and recommendation

Conclusions

The Secretary of State's statement of matters (Chapter 1)

10.1 In the statement of matters the Secretary of State particularly wishes to be informed about environmental effects of the proposed marina scheme as described in the Transport and Works Order. He also wishes to be informed about the Council's proposals for mitigating any adverse environmental impacts. These aspects of the statement of matters are reported in Chapter 1, Paragraphs 1.3 and 1.4.

10.2 In the report of my conclusions I address these environmental matters. My conclusions are based on an assessment of the impacts on the existing environment and mitigation proposals considered at the inquiries and in the written representations. I will deal with the matters by following the sequence of the chapters in this report, which in turn examine the major components of the environment that would be affected by the proposed scheme.

10.3 The statement of matters asks specifically for information for the Secretary of State about the following issues - any impact on nature conservation including impacts on protected sites at Flamborough Head; any impact on the marine environment arising from construction works, dredging and spoil deposition affecting marine sedimentation in Bridlington Bay; impacts arising from traffic generation; and the visual effects of the proposed scheme.

10.4 The Secretary of State also asks for information on the Council's proposals for mitigating any adverse environmental impacts caused by the proposed works, including those likely to arise from the works. He also wishes to know whether, and to what extent, any adverse environmental impacts would still remain after the proposed mitigation measures have been put in place.

10.5 In the following paragraphs I will examine my findings and conclusions with particular reference to the Secretary of State's statement of matters. I will not elaborate on the findings, as they are discussed at the end of each of the chapters of the report.

The existing environment (Chapter 2)

10.6 The characteristics of the existing environment are summarised in Chapter 2. Clearly, the Bridlington Bay area is not seriously affected at the present time by pollution of any kind or by activities that disturb the natural processes of the marine environmental system. The effects of the scheme need to be considered in that context. Bridlington Bay is a pristine area of natural environment. It contains a variety of fauna and flora unaffected to any significant extent by human activity. The coastline and sub-tidal area around Flamborough Head are of special interest for nature conservation and scientific study.

10.7 The town of Bridlington and its harbour are therefore situated in a bay that has hitherto been little affected by development, although it had the piers built in the 1840s and housing and other urban development over the years. The sandy beaches, for which the town is famous, are a distinctive feature, a product of the sedimentary processes in the bay that supply them with the sand that benefits the town. The amenity value of those beaches, and their quality, is demonstrated by their status as Bathing Beaches designated under the provisions of the EU Bathing Water Directive; and they hold a Blue Flag Award. It is generally agreed that they are a vital natural resource for Bridlington.

10.8 The near-shore area is of good quality in other environmental respects also. It encompasses the inter-tidal and sub-tidal zones that provide habitats for animals and plants, including bird

populations and fish and shellfish. These natural ecosystems have escaped adverse impact from development or pollution incidents.

10.9 The other dimension of Bridlington is the visual quality of the area. The seashore provides appealing scenery enjoyed by people who live in the town and the visitors who generate considerable tourist trade in the summer months, and who have done so since Victorian times. Protecting the landscape character of the town and this fine scenery has featured prominently as an issue for debate at the inquiries. I am also mindful of the relevant policies applying to the area found in national, regional and local plans.

10.10 **I conclude** that the evidence produced as a result of the EIA and in other contributions to the inquiries demonstrate that the existing environment that would be affected by the scheme is of the highest quality.

10.11 **I further conclude** that the absence hitherto of significant impacts upon this environment demands that exceptional care should be exercised in the promotion of any development that could cause damage to the natural features of the sea and seashore in Bridlington Bay, or to the landscape quality and views of the local environment enjoyed by the public and residents of the town.

The Environmental Impact Assessment and Environmental Statement (Chapter 3)

10.12 Objectors challenge the adequacy and accuracy of the EIA and the ES. There is argument about the scope of the EIA, particularly with respect to the projected topside development proposals for the platform of reclaimed land that forms part of the proposed marina scheme. I report on the challenges and the responses made at the inquiries in Chapter 3.

10.13 Regarding the scope of the EIA, I am concerned about the inclusion in the ES and in the Council's evidence of information relating to the projected topside development as a basis for putting forward mitigation measures to alleviate the major adverse impact of the proposed marina scheme on landscape and views. Such information relating to speculative development proposals that are outside the scope of the Works Order inquiry is inappropriate, a matter that I consider in more detail in Chapter 9 and Paragraph 10.58, below

10.14 **I conclude** that the EIA and the ES are adequate for the purposes of the Works Order, and that the ES does not contain errors of fact that are of material significance.

10.15 **I further conclude** that information relating to proposed topside development proposals, such as the so-called Development Framework, that are outside the scope of the Works Order should be disregarded as used by the Council as a basis for mitigating the environmental impacts of the scheme described in the Order.

Effects on the coastal regime (Chapter 4)

10.16 There are two matters of concern to the Secretary of State regarding these effects. The first is impact on the marine environment arising from construction works, dredging and spoil deposition and their effects on sediment deposition in Bridlington Bay. The second is the impact of the scheme on nature conservation, including the protected sites at Flamborough Head.

10.17 The first of these matters involves the effects of the works on current flows and the net long-shore southerly movement of sediments. It has been investigated in the EIA in consultation with English Nature and their specialist consultant. The effects would be of insufficient magnitude to cause a physical impact on the cSAC as it is situated some 700 m to the east of Bridlington. The second of these matters, nature conservation, has also been investigated in the EIA and by English Nature. The results of those investigations and the conclusions of the scientists involved are summarised in Chapter 4 and indicate that no significant impact on the ecological and nature conservation interest of the Flamborough Head area, including the cSAC, is likely to arise. Nature conservation impacts at the site of the proposed works are considered in Paragraphs 10.26 to 10.29, below.

10.18 **I conclude** that the impact of the scheme on current flows and the net long-shore southerly movement of sediments would be negligible.

10.19 **I further conclude** that the impact of the scheme on the ecological and nature conservation integrity of the cSAC at Flamborough Head would be at a negligible level of significance as reported in the ES. The scientific evidence persuades me that the cSAC is located at such a distance from Bridlington as to be outside the zone of influence of the site of the proposed works.

Effects on water quality and sediment quality (Chapter 5)

10.20 Construction work would cause an impact at minor adverse to major adverse level of significance on the bathing water quality of the beaches at Bridlington. They would be of a short-term nature and are subjected to proposed mitigation measures to oblige the contractors to meet the requirements of the Environment Agency's pollution prevention guidelines. Several other sources of pollution are identified and mitigation measures would be applied.

10.21 **I conclude** that these sources of pollution, though unwelcome, can be controlled and managed so as not to cause irreversible environmental damage. I am also conscious that they would be of short-term duration assuming the construction phase is not prolonged beyond the expectations indicated in the ES.

10.22 **I further conclude** that the risks to water quality and sediment quality in the longer-term arising from operation of the scheme are not of sufficient magnitude to cause concern provided the mitigation measures proposed in the ES and by the Council and the other pollution control measures reported to the inquiries are strictly applied in accordance with the regulations and standards imposed by the relevant authorities, notably the Environment Agency and DEFRA.

Effects on fauna and flora including birds, fish and shellfish (Chapter 6)

10.23 There are four issues giving rise to concern. These are effects of the scheme on the ecological integrity of the cSAC, effects on habitats and fauna and flora occupying the site of the works, pollution effects, and effects on fish and shellfish.

Ecological integrity of the cSAC

10.24 I have already concluded that the effects of the scheme on the sedimentary transport regime would be unlikely to jeopardise the integrity of the cSAC (Paragraph 10.18, above). Following a wider and deeper assessment of the effects on fauna and flora the Council claim that the impact of the scheme on the ecology of the cSAC would be negligible. Consultations they held with English Nature have not caused them to alter their view. I consider that the Council have arrived at a reasoned conclusion.

10.25 **I conclude** that there are no serious grounds for doubting that the integrity of the cSAC would be secured provided the scheme, if it goes ahead, is constructed according to standards established in the various discussions between the Council and the regulatory bodies, particularly English Nature, and is operated and monitored effectively thereafter.

Fauna and flora occupying the site of the proposed scheme

10.26 The ES concludes that the effects on fauna and flora in the area covered by the footprint of the works could be described as a major adverse impact. I agree with that conclusion, as the scheme would obliterate 13 ha of foreshore habitat as well as 7.0 ha of adjacent sub-littoral habitat. This area is pristine natural environment and includes the south wall of the South Pier and a total of 20 ha of dry, inter-tidal and sub-tidal parts of the adjacent section of the South Beach. The works would displace both sandy and rocky shore communities. The Council however submit that although the effect could be described as a major adverse impact the sandy communities are common and therefore not of any nature conservation interest. That is a misleading concept. In this particular case the nature conservation interest is most important, as it is an integral part of an amenity beach. This

beach is ecologically the most varied stretch of seashore in Bridlington and is located alongside the harbour and the centre of the town. It is also designated as a Bathing Beach under the EU Bathing Water Regulations 1991 and has been given a Blue Flag Award.

10.27 A similar argument is applied to the rocky shore communities and the bird populations that inhabit this area, even though in these cases it is admitted in the ES that the species and habitats are not commonplace and are locally unique. In the case of the former, the Council propose various mitigation measures in an attempt to re-create acceptable habitat conditions among the new structures of the scheme. In the case of the birds, they claim that they will move to the north of Bridlington as construction displaced their feeding and roosting grounds in South Beach.

10.28 **I conclude** that the Council are misplaced in their judgement that the communities of sand loving organisms can be removed altogether because similar habitats occur elsewhere in the area. Similarly, they are wrong in their intentions towards the rocky shore communities and the bird populations. The mitigation proposed for the rocky shore communities is not clearly explained and in any case would not be adequate as the loss of this habitat in this beach area is part of a seriously damaging incursion into irreplaceable natural environment in the town. The Council assume the birds would find new habitats elsewhere and offer no mitigation. Their disappearance would be a significant loss of biodiversity in the town.

10.29 **I further conclude** that destruction of ecological features under the footprint of the scheme is particularly serious because those features form part of the amenity beach in the town, and I discuss that matter in more detail in Paragraphs 10.60 to 10.63, below. These features cannot be replicated spatially or reconstructed completely elsewhere in the vicinity. The impact is at a major adverse level of significance and the mitigation measures put forward would have little or no ameliorative effects. Because of its scale and its position in the town the proposed works would create a major adverse impact which, in my opinion, is unacceptable and should be considered as so serious as to threaten the implementation of the scheme in the Order.

Pollution

10.30 The ES reports on all sources of pollution, including increased turbidity, during the construction and operation phases of the scheme. There would be some adverse impacts on organisms, including fish and shellfish, and their habitats, mostly near the site of the works. It would diminish with distance from the site. Mitigation measures are proposed and regulatory practices, including monitoring, would come into force if deemed necessary.

10.31 **I conclude** that although there is a potential threat to fauna and flora, including fish and shellfish, in Bridlington Bay arising from pollution from the scheme, I am satisfied that the issues have been identified and properly addressed. The mitigation measures proposed would appear to be adequate.

Fish and shellfish

10.32 The ecological factors affecting the natural fish resource, and associated organisms such as lugworms used as bait, are the same as those influencing the well being of marine fauna generally. The natural fishery resource would suffer an adverse impact, mainly through increased turbidity in the water column during construction of the works. The Council are confident they can control all sources of pollution in cooperation with the regulatory bodies, and mitigation involves establishing machinery for the purpose.

10.33 **I conclude** that the mitigation proposals described in the ES would be adequate, except that they would obviously not apply to the area of 20 ha where the habitats of fish and shellfish, and lugworms and other bait, would be buried under the footprint of the works.

Effects on human beings, and on buildings and other man-made features (Chapter 7)

The natural fishery resource

10.34 Construction impacts would cause much disturbance to fish thereby affecting fishing from boats and from the shore. It is understood that it would be at worst an impact at a moderate adverse level of significance and of short-term duration provided the mitigation proposals are adopted. During operation of the scheme fishing activities would be expected to continue at a level not drastically different from that prevailing at the present time.

10.35 There would be significant changes in the pattern of shore fishing with the loss of the South Pier and the section of the South Beach nearby that would be buried under the reclaimed land and the other structures in the works. This impact, which at worst is estimated as of a moderately adverse level of significance, both in the short-term and longer-term, would be unavoidable but not of itself totally unacceptable. With additional mitigation the impact could, over a period of time, be further ameliorated.

10.36 **I conclude** that the impact of the proposed scheme on the natural fishery resource is undesirable mainly due to the loss of the facilities for shore fishing and bait digging now available in the area of South Beach that would be obliterated by the works. I do not regard this impact as totally unacceptable if considered in isolation from other associated effects on the beach and near-shore marine environment. However, it would be a serious loss of beach recreational amenity, and I consider the matter further in Paragraphs 10.42 to 10.44, below.

Noise and vibration

10.37 Noisy activities during construction would result in an impact at a major adverse level of significance unless mitigated. The Council claim that mitigation proposals described in the ES would reduce this to an impact at a minor adverse level of significance. The data upon which they rely are convincing and I agree that, although unwelcome, the noise impact would be acceptable and short-term in duration. There is apparently no reason to be concerned about impacts arising from vibration, which would be at a negligible level of significance.

10.38 **I conclude** that noise and vibration impacts on the environment, if the proposed mitigation measurers are implemented, would be at a minor adverse and negligible level of significance, respectively, and therefore acceptable in the short-term.

Tourism, navigation and recreation

10.39 The impacts involved cover a variety of human interests and activities, mainly vessel movements, recreational fishing from boats and the shore, disabled access, danger to the public arising from the use of rock armour, archaeological and historic features, and beach amenities. Some of these impacts are intricately connected to each other and to others discussed elsewhere in my report. The principal aspects are referred to below.

Vessel movements

10.40 Danger arising from vessel movements during construction would be an impact at a major adverse level of significance, but it could be reduced to a minor adverse level if rigorous mitigation measures are applied, mainly concerned with disciplined ship and boat handling. I agree with the assessment provided the measures are vigorously applied and monitored.

10.41 **I conclude** that the impact on navigation would be at a minor adverse level of significance in the longer-term, and acceptable, if the proposed mitigation measures are implemented.

Recreational fishing

10.42 Recreational fishing locations on the shore used traditionally by tourists and the local people would be severely affected. The Council accept that fishing facilities off the South Pier and the stretch of beach below would disappear completely. That would be an impact at a major adverse level of significance.

10.43 The Council suggest that mitigation in the form of new facilities elsewhere in the scheme would reduce the severity of this impact. Inevitably new opportunities would appear further away from the location of the current long standing facilities but the mitigation proposals are not likely to be effective in providing convenient and readily accessible shore fishing for the public, a matter of concern to objectors and which is also discussed in Chapter 6 and Chapter 9.

10.44 **I conclude** that the impact on recreational fishing would be at a major adverse level of significance and that the proposed mitigation measures are unlikely to be adequate to make it acceptable.

Danger to the public and effects on disabled access

10.45 Rock armour accessible to the public on South Beach and elsewhere would be a source of danger. The disabled would also find it difficult to negotiate the Southern Promenade. These are potential impacts at an adverse level of significance but mitigation would reduce them to acceptable levels although there would be residual danger to unsupervised children.

10.46 **I conclude** that there would be danger to the public and effects on disabled access but it is not unacceptable provided the proposed mitigation is implemented and attention directed to the problem of unsupervised children.

Archaeological and historic features and sub aqua activities

10.47 The obliteration of most of the south face of the South Pier is a matter of great concern to objectors and is dealt with in Chapter 6 and Chapter 9, and in detail by Dr Moseley in her report on listed structures. This is an impact on the environment at a major adverse level of significance. No mitigation is proposed that would have a significant effect on the severity of the impact.

10.48 The effect on archaeological and historic features in the marine environment would be at a minor adverse or moderate adverse level of significance and may be less serious as a result of adopting the mitigation measures proposed. The associated sub-aqua activities would not be severely affected. These impacts are therefore acceptable.

10.49 **I conclude** that the effect on the historic south face of the South Pier would be an environmental impact at a major adverse level of significance and that no mitigation measures are applicable because of the nature and extent of the impact. This impact is therefore unacceptable.

10.50 **I further conclude** that the impacts on the archaeological and other historic features in the marine environment would be at a minor adverse or moderate adverse level of significance and acceptable if the proposed mitigation measures are implemented.

Beach amenities in the town

10.51 Loss of fauna and flora and their habitats, and of landscape character and views resulting from obliteration of part of South Beach are considered in detail in Chapter 6 and Chapter 9, respectively. Even though the North Beach would be unaffected the impact on human beings in terms of sandy beach amenities used intensively by tourists and local people is a subject of strong and widespread objection. The view taken by the Council that the public are "receptors that are mobile" is not welcomed. The issue is the claim by the Council to the effect that matters would not change in that the beach would disappear and then reappear at a distance of 530 m to the south of the root of the South Pier, just beyond the new rock armour breakwater. Objectors are insistent that the new breakwater would be less appealing and less safe than the harbour wall, that the "new" beach would be too far from the town and that the views from it would be inferior. The evidence strongly suggests that their assessment is correct. The Council have not provided convincing evidence that refutes the assessment of the objectors. The impact on beach amenities for the public would be at a major adverse level of significance if all these matters were taken into account.

10.52 **I conclude** that the effects on the beach amenities of the town would be an impact at a major adverse level of significance. Mitigation measures that would be effective in bringing about a

significant reduction in the severity of the impact have not been proposed and are probably not available. The impact on beach amenities is therefore unacceptable.

Effects of the scheme on air and climate (Chapter 8)

10.53 The issue of air pollution does not feature prominently in the evidence of objectors. It is clear that some changes in levels of emissions would occur, predominantly from engine exhaust gases, but they are not regarded as likely to cause a major effect on the environment. They would be largely transient, occurring during construction, and the result would be an impact at a minor adverse or negligible level of significance. In the longer-term there are opportunities to contain growth in traffic volume in the town in accordance with the criteria and standards adopted by the Council's transport department.

10.54 **I conclude** that the impact of the scheme on air and climate would be at a minor adverse or negligible level of significance and the mitigation measures proposed are appropriate. The impact would therefore be acceptable.

Effects of the scheme on landscape and views (Chapter 9)

10.55 The effects can be classified into (1) impacts arising from construction activities and (2) longer-term impacts arising from the completed works consisting principally of the platform of reclaimed land, the breakwaters and the marina basin. I consider, on the basis of all the evidence provided, that there would be six major impacts altogether, and I describe them briefly in Chapter 9, Paragraph 9.84. My conclusions with respect to these impacts are as follows.

Visual intrusion during construction

10.56 The ES claims these effects during construction of the works would be of short-term duration and because of that, and through the application of mitigation measures, they would amount to an impact at a minor adverse level of significance. I agree with their assessment.

10.57 **I conclude** that visual intrusion during the construction of the works would be at a minor adverse level of significance and, with mitigation measures in place, acceptable.

Alteration in the character of the landscape

10.58 The completed scheme would result in a major alteration in the character of the landscape because of its scale in relation to the size of Bridlington Harbour and the central area of the town around it. The ES states clearly that the impact would be at a major adverse level of significance, an assessment that is strongly supported by the views of objectors. The Council's planning officer disagrees. I think he has misdirected himself by considering that the proposed topside development would, in due course, be an attractive addition to the landscape character of the town. That is not a relevant consideration as I have explained in Paragraphs 10.13 and 10.15, above. I prefer the assessment in the ES, as supported by objectors, that the effect of the scheme in the Works Order on landscape character would be at a major adverse level of significance. No mitigation proposals are put forward that would be effective in reducing the severity of the impact to any significant extent. The benefits that may appear in the proposed topside development cannot be assessed. In any case, any addition to the works in the scheme arising from building on the platform of reclaimed land would in certain respects cause even further adverse impact on the landscape character of the town.

10.59 **I conclude** that the effect of the scheme on landscape character would be an impact at a major adverse level of significance. No mitigation measures are proposed and are probably not available. The impact is therefore unacceptable.

The scheme would obliterate 20 ha of beach and near-shore environment

10.60 In Chapter 6 the effect of the scheme on wildlife habitats in the vicinity of the harbour and the South Beach is considered. The loss of pristine natural environment is regarded in the ES potentially

as an impact at a major adverse level of significance. As indicated in Paragraphs 10.26 to 10.29, above, I agree with that assessment. I consider that obliteration of the beach and sub-tidal areas, alongside most of the south face of the harbour wall, unacceptable because these impacts damage biodiversity and destroy a beach area that is particularly appealing to the public, features that are collectively regarded as a central amenity and visual attraction in Bridlington. The obliteration of these 20 ha of pristine marine environment strategically located adjacent to the harbour and near the centre of the town is among the most serious of the major adverse levels of impact identified in the scheme.

10.61 **I conclude** that the obliteration of beach and near-shore environment of high ecological and visual quality would be an impact at a major adverse level of significance. It would seriously damage the natural heritage of Bridlington and particularly the amenities provided for the public by a particularly important beach near the centre of the town. No appropriate mitigation proposals are made and are probably not available. The impact is therefore unacceptable.

The scheme would obliterate the seaward face of the South Pier

10.62 This matter is dealt with in detail by the listed buildings assessor, Dr Moseley. The environmental impact of the scheme in covering most of the seaward face of this historic pier would be at a major adverse level of significance because of the damage caused to the visual quality of the southern part of the town and the South Beach area. There would also be losses of wildlife habitat provided by the harbour wall as described in Chapter 6. No mitigation measures are put forward that would significantly diminish the seriousness of this visual and ecological impact.

10.63 **I conclude** that the covering of most of the seaward face of the South Pier would be an environmental impact of a major adverse level of significance because of the damage that would occur to this built heritage that contributes to the historic, visual and ecological quality of the area. No mitigation measures are proposed that would be effective and I consider the environmental impact as unacceptable.

The impact of the scheme on the landscape character of the area and on views from the streets and buildings along the seashore to the south of the harbour

10.64 Twelve visual receptors examined in the EIA would be affected. The impact in three cases would be at a major adverse level of significance, in four moderate adverse, in one minor adverse, in one minor beneficial and in three negligible. Four mitigation measures proposed, as indicated in Chapter 9, Paragraph 9.31. During the inquiries the first of the four measures referred to in Paragraph 9.31 was withdrawn as the Council had decided to bring forward a transitional development proposal to bridge the gap between the completion of the scheme in the Works Order and that of the full topside development, which may span a period of up to ten years. The visual effects of the scheme in the Works Order, overall, amount to an impact at an adverse level of significance. I consider the three remaining proposals for mitigation referred to Paragraph 9.31 would contribute very little towards ameliorating the profound impact of the scheme on the views from the receptors examined. The Council have also attempted to appraise the impact of the topside development on the scheme in the Works Order but I am not taking their findings in that respect into account as a contribution towards mitigating the effects of the proposals in that Order on the existing environment. There is also a fundamental disagreement between the opinion of the Council's planning officer and the findings of the ES regarding the impacts of the works on the landscape and views. The former insists that the proposed marina scheme has no unacceptable impact on the landscape while the ES concludes that the impact is at a major adverse level of significance, the most severe of the assessors' categories. These fundamental inconsistencies in the evidence provided by the Council undermine their position with respect to environmental impact assessment of their proposed scheme.

10.65 **I conclude** that the scheme would have, overall, a major adverse impact on the views from receptors in the southern part of the town overlooking the area close to the site of the proposed works, as indicated in the ES and the evidence of objectors. The mitigation proposals would not make a significant contribution towards diminishing the severity of the impact. I consider the impact on

landscape character and on views from receptors to the south and west of the scheme to be unacceptable.

The impact of the scheme on views from the seashore and the roads on the top of the harbour piers

10.66 The principal effect of the scheme on views from the seashore on South Beach looking north and east from points to the south of the new rock armour breakwater would be to eliminate any views of the South Pier. It would be largely buried in the land reclamation and the remainder of what was exposed would not be visible above the breakwater. The other impact would be the overpowering prominence of the rock armour breakwater structure running from the promenade out to sea for a distance of some 620 m. This would be a new engineering structure that does not reflect the architectural style of the Bridlington waterfront, a matter of great concern to objectors. It would not be a friendly feature on this beach and it also poses some danger to children. A mitigation measure in the form of rock revetments on the face of the structure is proposed in the ES to present a visually more natural appearance where the rock armour joins the beach.

10.67 Views from the harbour piers seaward and to the south are not considered to any great extent in the ES. The platform of reclaimed land would remove close up views of the beach and the visible natural interest associated with the wet beach below, including particularly the bird populations. I do not agree with the assessment with respect to the impact on views from the South Pier southward as described in the ES and reported in Chapter 9, Paragraph 9.25. It is not reasonable for the ES to conclude the impact would be at a minor adverse level of significance, which is defined as "impact is small scale and of little concern. It is undesirable but acceptable". I do not consider that is a fair assessment when the views from this strategic part of the town of the sea and the beach to the south would become grossly altered or totally obscured by the platform of reclaimed land and the breakwaters.

10.68 **I conclude** that views from the South Beach in a northerly and easterly direction would be grossly affected by the presence of the new southern breakwater on the beach and the reclaimed land between that structure and the South Pier of the harbour. I consider that the mitigation measures proposed would be purely cosmetic and are of minor significance. I consider the impact of the proposed scheme on views from the South Beach as unacceptable.

10.69 **I further conclude** that the views from the strategically placed harbour piers to the south along South Beach, and to some extent seaward, would be grossly altered and partly obscured. In the case of the South Pier I consider it is greater than of a minor adverse level of significance as indicated in the ES. No mitigation measures are proposed. I consider this impact as unacceptable.

Summary of Conclusions

10.70 The environmental impact of the proposed marina scheme is wide ranging. Much attention is given in the ES to the effects of the scheme on the coastal regime in Bridlington Bay, especially the nature conservation interests around Flamborough Head. I find no reason to be concerned on the basis of the evidence that the bay as a whole would be seriously affected or that the Flamborough Head interests would be jeopardised if the works were constructed and operated as a marina in accordance with the guidelines provided by English Nature and other regulatory authorities.

10.71 The effects of the scheme on the town centre and South Beach at Bridlington and the immediate marine and coastal area would however be seriously damaging. The inhabitants of Bridlington and visitors to the town's sea front would feel impacts at a major adverse level of significance. The principal matters of concern are as follows. In each case the impact is so adverse as to be unacceptable and so serious as to threaten the implementation of the scheme.

(1) Some 20 ha of prime quality and popular beach, designated as bathing waters under the EU directive and having a Blue Flag Award would be buried under the works with consequent loss of wildlife and their habitats close to the centre of the town.

(2) The landscape character of the town would be severely affected partly because the scheme is so large and partly because it overwhelms the integrity of the harbour and the town centre as an architectural and historic entity.

(3) Views of the beach and near-shore environment affected by the scheme would be obliterated or severely altered at many of the receptors examined in the ES.

(4) Beach and seashore amenities of the South Beach would be destroyed or severely altered, including facilities for admiring the view of the historic harbour, enjoying the sands, seawater and the wildlife, and digging for bait and fishing from the shore and the South Pier.

(5) The popular South Beach would be separated from the town centre and the harbour by the development along the sea front by a distance of 530 m from the root of the South Pier. Traditional beach users would be displaced and the pubic obliged to travel that additional distance to reach the sands from the harbour and town centre.

Recommendation

10.72 Because the proposed marina scheme described in the Works Order and at the inquiries would, if implemented, result in widespread and destructive impacts on the natural and historic environment in the centre of Bridlington as well as the associated seashore amenities of the popular South Beach I recommend that the Secretary of State ought to be advised that the Transport and Works Order be not made.

Professor T O Pritchard PhD BSc FRSA

Assessor

January 2003